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WHAT INDUSTRIAL MANAGEMENT HAS LEARNED IN THE LAST TWO YEARS

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BUSINESS depression has stimulated hard thinking. It has brought out an ever-swelling flood of proposed remedies, many of which are mere panaceas with no appeal to sober business judgment. The ensuing analysis by Ralph E. Flanders, Jones & Lamson Machine Co., is a penetrating study of the problems of adversity from the practical viewpoint of management. It emphasizes particularly the impossibility of an individualistic policy in an economic world in which each man's fortune is inextricably tied up with his neighbor's.

"The individual manufacturer," says Mr. Flanders, "has been accustomed to think of the maximum output at the height of prosperity as representing the opportunity to cash in on the 'velvet', but since for one reason or another this maximum production seems inevitably to be met by the failure of consumer purchasing power, that velvet begins to have a shoddy look."

GOOD business practice requires that the vicissitudes of the business cycle be so met as to serve the following ends: (1) safe expansion of earnings, (2) maintenance of earnings when expansion fails, (3) maintenance of earning power, (4) maintenance of cash position—other liquid assets decreasing, (5) maintenance of fixed assets, (6) maintenance of management policies—efficiency, quality, etc., (7) maintenance of personnel and its morale, and (8) maintenance of markets and customers' good will.

These ends are not put in the order of their importance, but in the order in which they have to be thrown overboard to lighten ship as the financial storm increases in severity. The last thing to be submitted to would be the loss of customers' good will. A business is indeed near shipwreck when this has been discarded.

In the discussion of the various periods of the cycle, we will arbitrarily divide it into four, the first being that of depression in which we now find ourselves, the next step being recovery, the third boom and the fourth collapse. The past two or three years should teach us the particular kind of action with which to meet the contingencies of these four stages. We may properly say from the lessons of the past that the period of depression should be devoted to long-time planning and preparation. During the period

THE purpose of business is to make profits." This truism is now seen as being subject to qualification. Frequently an excessive profit today begets a serious deficit tomorrow. "Material purchases," declared Mr. Flanders in this article, which is based on a recent address before the Smaller Industries Conference, "should be made with reference to the current manufacturing schedule rather than to possible changes in price. Investment of reserves should be made from the standpoint of availability and safety rather than possible speculative profits."

of recovery action on a predetermined program should begin. During the boom the detailed vicissitudes of the business should be subjected to severe scrutiny and critical judgment, as the future fate of the business is determined by the course of action taken at this time. During the collapse, activities will naturally relate to routine measures of constructive conservation.

Let us consider the various problems that come up in the course of the business cycle under the headings: management policies; sales policies; personnel and wage policies; product, research and development; maintenance and replacement of buildings, equipment, etc.; efficiency; expansion; and financial policies. The last element—financial—enters into all the previous ones.

Production Policies

It is inadvisable to build into stock as the peak of production approaches. It is almost a truism to

say that we must restrain our speculative enthusiasm at the peak of business. We cannot, of course, tell just when the peak is coming or when it has arrived. This means that there may be a year or two when we should be very "hard-boiled" about the future, taking the present as it comes, and making the most we can of it. We should be building up the usefulness of our various trade organizations. In the industries for which such reports are possible, there should be obtainable monthly reports of production, shipments, stocks on hand, new orders and countermands. A close scrutiny of such statistics should enable us to get a fairly clear-headed view of the actual condition of business as distinguished from our emotional reaction to it. We should also follow the best obtainable business forecasts, but unless these have improved, we may find them unreliable as our greatest need for them approaches.

Sales Policies

Our experience would lead us to believe that it is not advisable to push instalment selling during the boom. One of the most badly needed improvements in American business is to find some safe and effective way to permit instalment selling during the depression. Then is the time that it is needed. While recaptures of goods sold on extended terms are reported to be extremely low, this does not tell the whole story. It seems to be beyond question that the large volume of instalment selling during the boom has been one of the elements that has delayed recovery. New instalment selling, if there is any way of arranging it, would hasten recovery if put in force at the present time. It is to be hoped that new developments and new courage on the part of credit organizations, and the development of something corresponding to "equipment trusts" for smaller undertakings than those to which they are usually applied,

will offer opportunities for constructive developments in business practice.

During the depression it gets to be a serious problem as to whether and when to curtail the selling force. It goes without saying that there is usually an outer fringe of order takers who show no signs of becoming effective salesmen and whose usefulness therefore ceases when the market gets in the buyers' hands. Of the different types of business, it is probable that the more inelastic ones will properly decide to curtail selling expenses, while those in which slight price changes with continued selling pressure will still produce results should perhaps be spurred to renewed activity. When the work in the field is finally curtailed, good results for the future can be attained by bringing the salesmen in for contact with and study of new developments and for further instruction in the practical details of their work.

The question of whether to reduce prices is a vital one. Should work be taken at a loss for carrying overhead? In some cases this may seem the proper thing to do. In such cases it should be called "stop loss" work rather than "work taken at a loss." It is seldom desirable to do this in a highly competitive field, because the net result is that all manufacturers will meet the new price and there will be no change in the relative position. One may say that the price for old work should not be cut beyond the profit point.

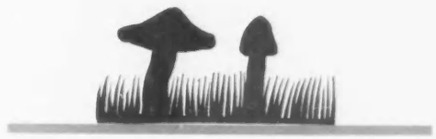
A little better case can be made out for taking

on new work or contract work which lies outside the field of active competition. If such work carries the labor and material and overhead which can be strictly assigned to it, with a fair margin for carrying the general fixed expenses of the company, this may be worth while. Such work should be of the type readily discarded in favor of the regular product as soon as business picks up.

There is little possibility of steadily enlarging foreign markets to take care of steadily disappearing domestic ones if the manufacturer is not already well rooted in the foreign field. The habit of depending on foreign markets for success in manufacturing is dangerous, as the home market in the long run offers by far the most attractive and profitable field.

Personnel and Wage Policies

No better policies have ever been announced than those of the General Electric Co., which a few years ago stated that it would, when business is increasing, (1) add employees as slowly as possible, (2) increase the number in especially busy departments by transfers from other departments, (3) resort to overtime before increasing the working force, and (4) postpone plant renewal and maintenance work as much as possible, employing the men on regular

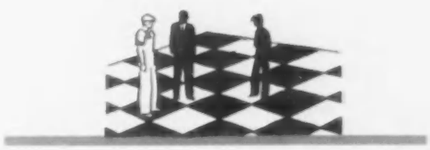


production. When orders begin to fall off it (1) ceases hiring immediately, (2) cuts out all possible overtime and brings departments down to a normal week, (3) transfers workers from slack to busy departments, (4) stimulates the sales department to secure cooperation of customers and get business for future delivery, (5) builds standard apparatus for stock, (6) sees that stocks at factory and district warehouses are brought up to the maximum, (7) uses men on maintenance and repair work, bringing the plant and equipment up to a high standard, (8) cuts the working week as generally and gradually as possible by departments down to 50 per cent of the normal week, (9) proceeds with construction of increased plant facilities previously planned, using its own men as far as possible, (10) drops new employees with less than one year of service, single people with no dependents and who are most easily spared, always with not less than a week's notice, and (11) in accordance with a long-established custom, tells employees whether the layoff is temporary due to lack of work or is permanent. In every instance of the latter, the usual compensation is paid, depending on character of work, age and length of service.

The burden of unemployment is best spread if hours are reduced rather than if men are let out. They cannot be reduced, however, beyond the point where good men will leave to get other jobs. As the period of bad business continues or increases, good men will not endure shorter and shorter hours without leaving. This point must be carefully watched, as the training of new men is expensive.

THERE is danger in making too generous dividend payments in prosperous times. Some industries, Mr. Flanders points out, have paid out in dividends funds which should have been retained for offsetting obsolescence of equipment. Replacement of machinery and plant expansion may frequently be carried on to best advantage during dull periods. "There is less danger in making unwise expenditures of this kind in the conservative atmosphere of the depression than there is in the hysterical stimulation of the boom."

There are many reasons for believing that the whole manufacturing industry is ready at this moment for a 40-hr. week with cumulative overtime—possibly 50 per cent up to 45 hr. and 100 per cent beyond that time. A good case can be made out for this proposal from the standpoint of industry. While there is no definite, reliable measure of the improvements made in machinery, methods and management, there have been great advances since the war and further advances of perhaps equal magnitude are in prospect. The normal result of these improvements is the provision of more goods with shorter working hours, which, however, are not coming in a socially useful form. For instance, there is a tendency for the displaced workers to make places for themselves in all sorts of "white-collar" jobs; hence the multiplication of selling and service activities which have had a mushroom growth with an elaboration and increased expense in almost exact ratio to the improve-



ments in production. These activities are of a precarious sort, and in their present forms cannot be permanent, because they are essentially inefficient.

It would seem that the common sense way to take care of increased effectiveness in production would be to recognize it by purposefully shortening working hours. It may be difficult to predict in just what way this would have a stabilizing effect on business, but I can conceive of no permanent solution of the problem of sustained prosperity which

does not translate improved knowledge and efficiency into shorter working hours; and it seems a reasonable act of faith to take the indicated step without foreseeing the minute details of the consequences.

The individual manufacturer has been accustomed to think of the maximum output at the height of prosperity as representing the opportunity to cash in on the "velvet," but since for one reason or another this maximum production seems inevitably to be met by the failure of consumers' purchasing power, that "velvet" begins to have a shoddy look. Here and there individual manufacturers may cash in on it, but it is evident that business as a whole does not.

From this point of view, proposals for a shorter working week with an increasing penalty for overtime may be considered as a brake on the unwise and over-optimistic endeavor to reach out for profits which are non-existent for business as a whole. This is probably one case of the widespread law of diminishing returns, and the advantage of the policy would be that this law becomes the familiar companion in day-by-day business procedure, instead of hiding in the bushes and jumping out on the surprised business man when the crash comes. In a sense, this policy should effect a spread of employment previous to and in anticipation of a letdown in business. The result might be to minimize materially the rigors of a depression.

Another way of looking at it is from the angle of the "labor reservoir" which a certain cold-blooded type of economist has always considered a desirable provision for industrial progress. This proposal provides a reservoir which is employed instead of unemployed and is ready to be drawn on at any time that industry is willing to pay the price in cumulative overtime. In many industries it will probably be difficult to make the 40-hr. proposal effective except as it is accepted by trade organizations on an industry-wide basis.

It seems highly desirable to maintain the wage rate over a crisis. The only excuse for lowering it

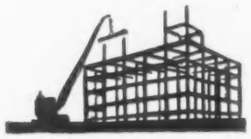
is the certainty of long-time lowering of the price level, such as was experienced throughout the world between 1820 and 1850, and again between 1875 and 1895. There are many who now believe that we are entering another period of long-time decline in prices. If so, our best efforts to maintain wages will ultimately fail, but if that is the case, nothing else that we can do will bring back the prolonged period of good business to which manufacturers and workmen are looking forward. A long-time price decline is a period of recession, with a generally lower scale of industry, commerce and standard of living.

It would appear wise for those companies located outside the metropolitan area to encourage the various means of thrift and self-support. Particularly for rural and suburban communities, the keeping of home gardens to assist in the support of the family is a valuable and too much neglected resource. Assistance and education in the direction of such efforts will be a valuable aid to decent living under adverse conditions.

By all means standards of production and quality must be maintained under the most unfavorable producing circumstances. If a force is being maintained larger than is required for production which can safely be financed, that force should be put to useful work of other kinds relating to maintenance and improvement of property, rather than being encouraged to work at low efficiency on their regular tasks.

Product, Research and Development

The time to expand these activities is immediately after the crisis. During the collapse and dur-



ing the depression is the time for experimental use of new product, building of new models, design and construction of new equipment, and of jigs and fixtures for producing them. There are many advantages to this policy. One of them is that it keeps the best men (who are required for this kind of work) at the lowest cost. It does this because the material cost of such work is low. It runs high in labor and low in material.

The second reason for this policy is that it enables the manufacturer to begin stocking new goods at the first pickup of business. This is in contradistinction to the usual policy of stocking up moderately on the decline. The stock made at that time may be out of style or out-dated in design when new business comes along. At the same time, a reduction of working forces should be made as soon as possible after the collapse, when there is still quite a bit of work available. The time when the workman most seriously needs work is along toward the end of the depression. Then is the time to begin to build up a stock of new goods, hiring back men who will be seriously in need of work and at a time when all manufacturing costs are low.

Product research and development should also have the aim of diversification, if it is of a kind that will smooth out the demand for products either through seasonal or cyclical fluctuations. However, such diversification is questionable if it tends to complicate the manufacturing policy.

Maintenance and Replacement of Buildings, Equipment, Etc.

When expansion of earnings has been given up, when maintenance of earnings appears no longer possible, when maintenance of earning power becomes difficult, when the cash reserve commences to evaporate, every effort still should be made to main-

tain the value of the fixed assets, and indeed to increase them if possible without too great expenditure for material or for labor beyond the amount which can be properly appropriated under the given conditions. This, again, is an inexpensive method of maintaining personnel, since the major part of the expenditures go to labor rather than to material; but here again, in order to maintain the morale, unusual care must be taken to see that the work is done efficiently and carefully.

Business as a whole can be steadied by having reserve funds available for steady equipment purchases through good times and bad. It will, however, take more courage than the ordinary manufacturer possesses, and larger means than are usually at his disposal, for him to carry this policy through on a strictly even basis irrespective of the state of business.

Efficiency

It is highly desirable to make the period of depression one in which advances are made in production and general managerial efficiency. It is the time to study methods of management and of production and to rearrange machinery in the plant; if new special machinery is to be built within the plant, it should be undertaken during this period.

Expansion

Replacement of machinery was indicated as a possibly desirable policy during dull times. There are many firms which have gone further than this, making most of their plant extensions at the low point. Their capital expenditures have been lessened by having the work done at a time when costs are materially lower than during boom times, and their actions have helped to fill in the depth of the depression and to cut the top off the peaks of speculative enthusiasm. There are dangers, however, in this process. The trend of business is, of course, full of hills and hollows as we know all too well, and in deciding on the rate of expansion, whether that decision is taken at the crisis or on the up-pull,

there is some danger of drawing the trend line tangent to one of the rising elements of the curve instead of bisecting the waves in the proper manner. There is less danger of making unwise expenditures of this kind in the conservative atmosphere of the depression than there is in the hysterical stimulation of the boom. Manufacturing plants may well have reason to question the wisdom of further expansion in big cities. There is a constantly increasing tendency to move from the metropolitan centers to the smaller manufacturing cities or even to the larger country towns.

Expansion should never be undertaken at the peak of business. As the peak is approached, the manufacturing plant should run two or three shifts or turn away business, but it should not expand.

Financial Considerations

There is an inevitable tendency to pay out larger sums in dividends during prosperous times than conditions of the business cycle prove advisable. As we look at our cash reserves, there are certain things that we naturally either earmark or put into separate funds as being unavailable for dividends. We build up reserves for taxes, for depreciation and for obsolescence of machinery and equipment. Even these elementary requirements are not always taken care of. The cotton textile industry, for instance, for many years paid out in dividends funds which should have been retained for offsetting obsolescence of equipment.

Furthermore, if we are wise, we will set aside a part of our cash reserves for continuing dividends on some reasonable scale during periods of low bus-

iness, and with that we will reserve other funds for continuing wages and salaries in accordance with some such conservative productive policies as have already been discussed. If the future business prospects and present financial status of the company indicate that expansion is advisable, certain other sums will be set aside for this purpose, to be spent preferably some time during the trough of the depression. If all these considerations are taken into account, they will undoubtedly act as a damper on large dividends during the peak of the boom, but they should favorably affect the income of the company and the income of its stockholders over long periods of time, and the stockholders should be taught to appreciate the effectiveness of such policies from their standpoint.

Investment of cash reserves is a difficult problem. The prime consideration is safety. To this should be added a reasonable return from interest, and only as a last dubious consideration should the matter of speculative increase be taken into account. These considerations suggest that reserves should go into time deposits as they are being built up. During the boom period, when there is a tendency for bonds to be low in price, it may perhaps be advisable to invest a portion of the reserve in gilt-edge securities of this type. Enormous amounts of private cash reserve funds were invested in the money market during the last boom. It is doubtful whether this serves a socially useful purpose; it also is doubtful whether any questions of this sort will restrain the investment of money under what are ordinarily safe conditions at a high rate of interest. We can only suggest that those responsible for the investing of these funds at least listen to the voice of conscience in the matter.

The problem of investing cash reserves in bonds, not merely with the hope of making a profit, but to

avoid loss in converting them into cash when needed, is not a simple one. During the last three years there has been such fluctuation in the prices of bonds of different types (as, for instance, railroad, utility, foreign and industrial) that it is difficult to suggest any useful course of action. On the whole, the best type of investment would seem to be Government bonds. Mr. Kuvin of the National Industrial Conference Board has very kindly compiled for me the average prices of seven varieties of Government bonds available. During the year 1929 prices were low. The average ran from 101 in July to a shade over 99 in November. Since that time they have been consistently rising until now the average is well over 104. This would indicate that a conversion of a part of a firm's cash reserves into Government bonds during the summer of 1929 would have put them in form to be realized on to advantage during the latter part of 1930 and through 1931 to date, at the time when they are most needed. The lesson would seem to be: Buy Government bonds during the boom and realize on them during what we hope is the latter part of the depression.

It must be said that there are no such clear indications for the hard times of 1921. Bond prices did not reach their low point until later in the boom, and they did not commence to rise until business itself began to improve. There were, however, special factors connected with the Government's maintenance of bond prices during the disposal of the last of the war series, so that this is not a typical instance.

Long-time budgeting covering the full cycle is a recommended practice for ideal financial control. This will be a difficult process, as each cycle has its own pecularities, but it should be carried out, at least so far as creating reserves is concerned. What can be done properly and more easily is to plan ahead for each of the four phases of the cycle, undertaking a fresh determination of the budget as the change of phase approaches. This budgeting will consider the various classes of activities we have discussed: that is, production, sales, personnel and wages, development, management progress, expansion, etc.

The framework into which these activities will be put should take into account sliding scales of expenditure in which, with full-time operations as a standard, adjustments to the separate conditions are made by judicious applications of short-time and over-time. A change in the wage rate, as previously stated, should be undertaken only when it is indubitably evident that a long-time change in the price level is in progress. This cannot be determined from a portion of the history of one business cycle. Materials and supplies will automatically vary with the rate of manufacture, but they can be given additional changes by applying increases or decreases in the finished stock carried or in the inventory of work in process. Salaries, bonuses and commissions can be given variations up and down with the decrease of production activity. Traveling expense and other variations have already been mentioned.

With all these considerations and others of a similar character in mind, it is possible to set up standard budgets for various degrees of activity. It is particularly important that this sliding budget be applied early in the collapse rather than waiting until the reserves are drawn dry.

Mention was made earlier of an endeavor to get the complete money's worth for all money spent, even when operating at a fraction of the normal output. The endeavor to make an operating profit for as long as possible has a psychological value. Of course, the time comes when it is necessary to shift from this basis to one of preserving cash assets. From the standpoint of morale and physical distress, it is desirable, if possible, to concentrate the short-time and lay off in the summer rather than in the winter, but it is difficult to order wisely the company's affairs so that this is possible.

All of these financial problems are complex, and the time has not yet come when definite rules of action thought out by experts and written in books will completely take the place of first-hand personal judgment in meeting the vicissitudes of business.

General Attitudes

There are certain qualities which run through all of the suggestions which have been made.

Every move should be constructive as well as conservative. The attractions of large-scale speculative profits should be resolutely refused. Material purchases should be made with reference to the current manufacturing schedule rather than to possible changes in price. Investments of reserves should be made from the standpoint of availability and safety rather than possible speculative profits.

A general recognition of the fact that the nation's prosperity is a homogeneous problem will and should grow on us from year to year. There is a real community of interest between the manufacturer as a producer of goods and his own workmen as one of the large body of consumers on whose prosperity the prosperity of the manufacturer is dependent.

Early in this article it was stated that there are four typical periods to the cycle and each period has its appropriate activity. There are also certain qualities of character which are appropriate to the four periods of the cycle:

Depression—Vision and imagination
Recovery—Courage
Boom—Sober judgment
Collapse—Patience

Unfortunately we have always tended to be one phase late, both in our appropriate action for the period of the cycle and the quality of the character which we manifest therein. We have waited on the collapse to exercise sober judgment, during the depression we have used such patience as we were able to muster, during the recovery we have enjoyed the excitement of vision and imagination, and we have delayed until the boom to display our courage, and that is just the time when we need it least.

THIS casting of steel from an electric furnace, with its arresting show of pyrotechnics, is one step in a process under which a razor blade will be made and marketed by the maker of the steel. The company is the Heppenstall Co. The cast ingot is forged under a steam hammer to convenient size, machined to remove scale and decarbonized area and finally hot rolled and cold drawn into strip 0.006 in. in thickness. The strip is then converted into the razor blades, which are shortly to appear under the name Hardtem.

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PROPER SAND CONTROL AND

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IMPROVEMENT of light steel castings by the application of foundry technique that will tend to maintain high ductility and eliminate pin holes was discussed by George Batty, director, Steel Castings Development Bureau, Philadelphia, in a paper entitled "The Inter-Relationship of Pin Hole Trouble and the Low Ductility Problem," presented at one of the steel sessions at the annual meeting of the American Foundrymen's Association. A lively discussion followed the presentation of the paper and considerable disagreement was expressed to some of the views taken by Mr. Batty. The low ductility problem, he said, had been solved with proper sand control to the extent that light steel castings are now being produced of higher physical properties than called for in specifications.

Aluminum Causes Low Ductility

Low ductility, the speaker said, resulted from the use of aluminum as a deoxidizer for metal produced from acid electric steel for light castings. However, the elimination of pin holes by dosing the steel with aluminum is not the only cause of the reduction of ductility in cast steel.

Pin hole trouble and the low ductility problem are usually identified with green sand practice. Mr. Batty said that green sand has a tendency to inject mold gases derived from the binder through the solidifying metal. Synthetic molding sand has been produced with the use of which pin hole troubles and low ductility have been largely avoided. Pin holes became more of a menace in the production of light steel castings with the advent of the electric furnace. The general opinion is that electric furnace metal has to be hotter than converter metal to give equivalent ability to run light-section castings. A remedy for pin holes was found in the introduction of aluminum in the hand ladle before pouring.

The writer took the position, when an investigation of deoxidation of steel was being conducted at the United States Bureau of Standards, that it could hardly be hoped that the solution of the low ductility problem lay entirely in the use of a deoxidizer other than aluminum and he still insists that the problem arose primarily as a result of the type of cure adopted to eliminate pin holes. Mr. Batty held that the formation of pin holes represents some reoxidation of the metal and the problem is one of preventing this reoxidation in the mold rather than adding a powerful supplemental deoxidizer which promotes embrittlement.

Trouble Comes from the Mold and Not the Metal

If it is conceded that immigrant mold gases and not gases coming from the steel are the cause of pin holes, the trouble must be identified with the mold and not with the metal. He held that, by preventing the injection of mold gases, the formation of pin holes would be avoided, as well as the necessity of adding a supplemental deoxidizer in the pouring ladle. He said that, while green sand has not been produced that will not inject some gas in the castings, sands are being produced with the use of which the injection of mold gases is almost insignificant and, as a result, the amount of alumina embrittlement has been so reduced that he considered the low ductility problem substantially solved.

However, investigations are being continued with a view of finding a means of applying a deoxidizer that will not have the same effect as aluminum in promoting decreased ductility. The speaker conceded that causes other than injected mold gases may produce the embrittled condition in steel and mentioned two of these as separate from the interrelationship of pin hole trouble and the low ductility problem.

Alumina, he said, is one of the causes, but such alumina may be produced through careless practice in the foundry. Also the method of adding aluminum to the pouring ladle involves a small production of alumina and consequently has some effect on the ductility of the metal. Aluminum should be added to the hand ladles as the metal is flowing from the large ladle and should be thrown into the stream of metal so that it will be carried down as far as possible below the surface.

Mr. Batty said that his paper was a rebuttal of some of the conclusions of a paper prepared by J. V. McCrae and R. L. Dowdell, which was presented before the American Society for Steel Treat-

THE LOW DUCTILITY PROBLEM

METHODS of solving the problem of low ductility in light steel castings made from acid electric furnace steel have been a bone of contention for some time. Foundry metallurgists differ as to the proper remedy. The author contends that proper sand control is the solution not only of low ductility but also of the pin hole problem. He asserts that aluminum additions are a major cause of low ductility. Dissenting and supporting opinions of other metallurgists are given.

ing last year, and he objected to the summary of the paper of those two authors. A new technique was demanded, he said, when electric furnace metal was delivered to foundries. A cure for pin holes was found in aluminum but that brought on the low ductility problem.

Two Solutions Offered by a Commentator

A written discussion of the paper was submitted by H. S. Rawdon, chief of the division of metallurgy, Bureau of Standards. He agreed with Mr. Batty that pin holes may occur in well-made deoxidized steel under improper mold conditions. There are two lines of possible solution of the problem, he said. The first is to treat the steel just before it is poured into the molds for degasification of the metal, with the hope that ductility will not be greatly affected by the presence of products resulting from the treatment. The other is to attempt to improve the mold so that conditions will not arise to affect the metal adversely. No improvement of the molds, however, can dispense entirely with the deoxidation treatment required in regular steel-making practice. Mr. Batty's paper, he said, served merely to amplify the second method of solving the problem of low ductility. The success claimed for mold improvement emphasized the importance of research on properties of foundry sands and methods of testing them.

Mr. Rawdon questioned the explanation of Mr. Batty regarding the formation of pin holes. The accumulation of gas adjacent to the metal under sufficient pressure to replace the surface layer of solidified metal, followed by the heating of the surface perforations thus formed, cannot be readily visualized, he said. If the mold gases enter the molten metal as large as or larger than the pin holes, it would seem doubtful if the deoxidation treatment could remove these bubbles.

Pin Holes Not Due to Mold Gases

While he agreed with many features of Mr. Batty's paper, J. H. Hall, assistant to the president, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., said he did not concur in the view that pin holes are due to an accumulation of mold gases. He was unable to see how such a conclusion was drawn. We know, he said, that over-doses of aluminum produce brittleness. Aluminum brittleness is set up by alumina. In dried core molds brittleness is set up by an over-dose of aluminum in the steel when there is no gas penetration. He did not believe that Mr. Batty had proved his contention.

Mr. Batty, in reply, said that metal may be contaminated by careless addition of aluminum in the hand ladle. This burns in the ladle on the top of the steel and the metal that goes into the castings is contaminated. Embrittlement, he contended, is no longer a problem but only an incident. The injection of mold gases is much less than formerly.

Aluminum a Cause of Embrittlement

Mr. Lorenz, Bucyrus-Erie Co., Milwaukee, took Mr. Hall's side in the discussion. He said that he made a set of test bars in dry sand molds and those cast from metal treated with aluminum showed embrittlement, while those in which no aluminum was used came out without brittleness.

One speaker told of running 40 tests from identical heats, all of which were given a final deoxidation treatment with aluminum. The metal was poured into teapot ladles and hand ladles. The test pieces showed great variation in ductility, although many had the same tensile strength. He believed the difference in ductility was due to the condition of the metal at the time aluminum was added. Mr. Batty added that the cleaning of the ladle is of

(*Concl. on page* 819)

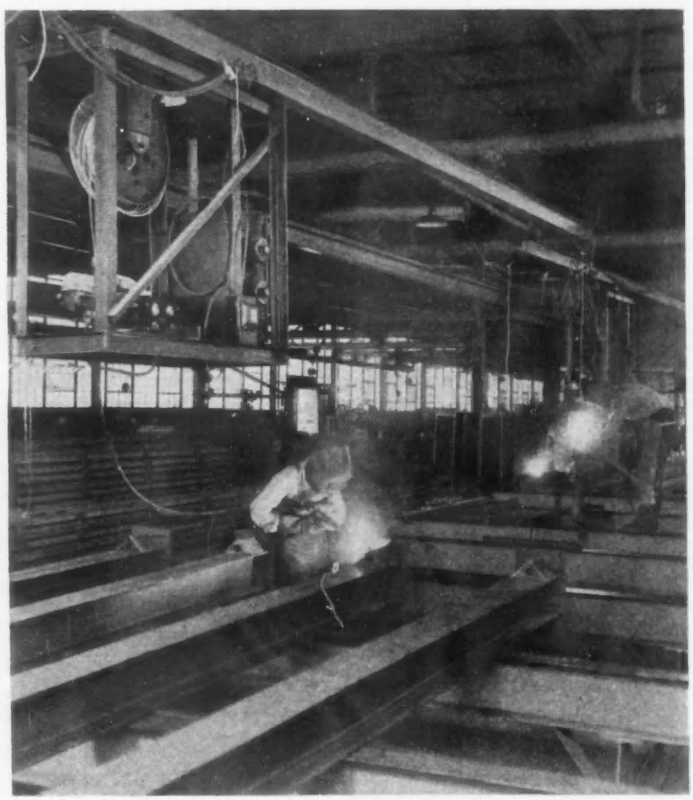
CONSTRUCTION E

By HARRY E. STITT
Chief Engineer, Austin Co., Cleveland

THE past few years have witnessed remarkable progress in welding as applied to all types of steel structures. Recently welding has been used more extensively in highway and railroad bridge building. It has been used with noteworthy success in the construction of more than 60 buildings, in electric traveling cranes, in thousands of miles of steel pipe and numerous other fields.

Arc welding for the fabrication and erection of structural building steel may be regarded by some as in its infancy. But it is a rather husky infant. Welding offers possibilities of overcoming many shop and field difficulties. It has brought about a changed attitude on the part of officials of municipal building departments and codes have been amended accordingly.

Such representative cities as Cleveland, Detroit, Boston, St. Louis, Kansas City, Dallas and Atlantic City have codes that permit welding. New York, Chicago, Philadelphia, Pittsburgh and Baltimore are revising codes now. In all, more than 150 municipalities, in some form or other, permit welded steel buildings. State legislatures are passing measures to enable additional cities to adopt rules and regulations applying to welding. In this connection, it may be just as well that these codes were slow in coming, for welding has developed unhampered.



Close-up view of one of the welding machines showing overhead suspension with lateral and longitudinal travel.

Welding and Riveting Made Optional as to Cost

A little over a year ago the Austin Co. offered welded steel construction at a cost comparable with riveted steel construction for the first time in building history. To meet the coming demands our company has completely equipped its plant in Cleveland for the straight-line production of welded fabricated steel. This plant, known as the Bliss Mill plant, has a monthly capacity of 1000 tons of welded steel and 1800 tons of riveted steel. It is so laid out in the assembly end that one side is used for riveted work and the opposite side for welded work, although either side can be used for riveted work at the present time on a straight-line production basis.

As a means of speeding up welding and thus reducing costs, we are now using welding assembly jigs for holding the work during assembly and welding when the contract warrants.

Truss sections are cut to length by a high-speed friction saw in a shear house at the side of the crane-equipped stock yard. This saw has a maximum capacity for cutting a 24-in. beam. Other equipment

ENGINEER DISCUSSES STRUCTURAL WELDING

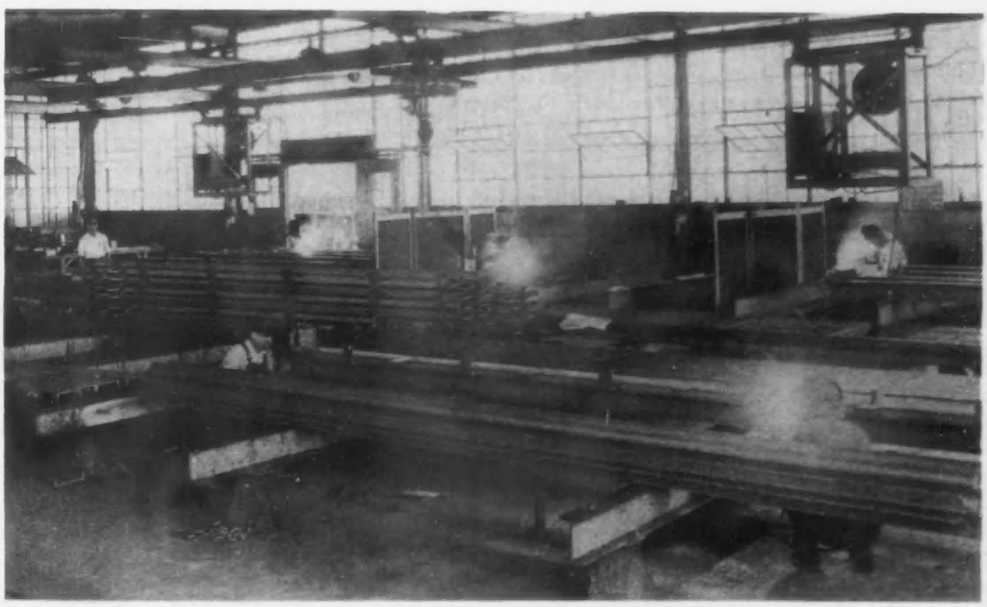
THIS article may be said to represent a user's viewpoint of welded structures. In his capacity as chief engineer of the Austin Co., the author has had a ten-year period of opportunity to observe the development of welding as applied to riveted structural steel. His opinions, as gained from this experience, are set forth in this article.

includes a plate shear and double angle shear. After cutting, the stock is carried through the shop in straight-line production to the point where final assembly occurs. This point is the dividing line between the riveting and welding departments.

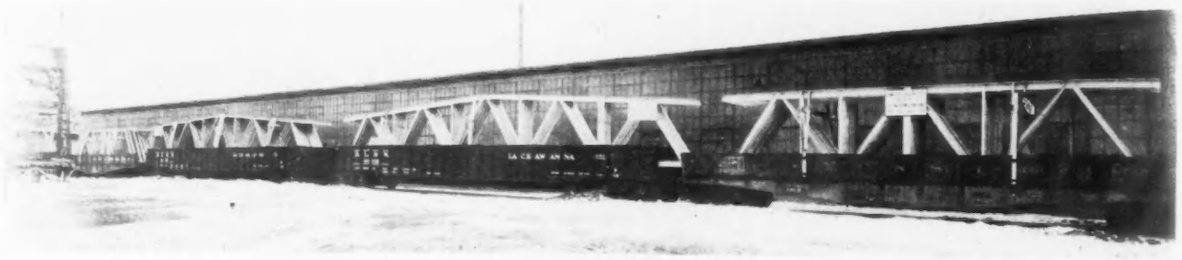
A row of punching machines is located in the line of travel. While most of the punching is done on the sections to be riveted, sometimes holes are punched in members that are to be welded. These holes are used for holding the pieces during erection before welding in the field.

Work that is to be shop welded without jigs is laid flat on an assembly bed, where the pieces are tack-welded sufficiently to hold them together for welding. Next they are turned over as they move to a bed in the next bay for the final welding. The welding is done by two semi-automatic 400 to 600 amp. arc welding machines, and four single-unit 300 to 400 amp. portable arc welding machines. The semi-automatic machines are suspended overhead on a hand-operated trolley, and the I-beam on which this trolley moves is attached to transverse trolleys, providing both a longitudinal and cross movement for the machines. Each machine covers an area 40 x 40 ft. The location, size and length of every weld is shown on the detail drawings which the welders follow.

When assembly jigs are used they are made of angles fabricated in a form to fit the member to be welded. These forms are slightly larger than the



A SECTION of the welding department of the Austin fabricating shop. This is laid out for "straight-line" production. On the opposite side, but not shown in this picture, is a similar "straight line" section for riveted members.



A trainload of welded trusses en route to the "windowless factory" of the Simonds Saw & Steel Co., Fitchburg, Mass.

trusses to be made. The jig is laid flat on the assembly bed and the pieces forming the outer members of the trusses are laid just inside the flange of the angles, forming the outer sides of the jig. The pieces rest against stops welded to the angles, and are held in place during welding by clamps or clips. The cross members are laid directly above similar members in the jig and are similarly clamped. With the use of the jig, several trusses or other duplicate units can be welded in the same time that it takes to weld one unit without a jig.

Welding the Trusses for the "Windowless Factory"

The largest and most interesting welded steel job that our company has done to date was the fabricating of 136 flat-type trusses, 70 ft. long and 10 ft. deep in the center, and 65 parallel chord-carrying trusses, 40 ft. long and 9 ft. deep in the center. These trusses were for the new windowless factory of the Simonds Steel Industries at Fitchburg, Mass., which we designed and built complete. It is the first industrial plant without windows or skylights, and also the first "controlled-conditions" plant in industry.

We were able to furnish this steel from our own plant very promptly, and ship directly to Fitchburg; the trusses were fabricated and welded in two to three weeks. The total tonnage of this job was approximately 425 tons. A similar order for riveted trusses would require about 490 tons of structural steel, so a saving of approximately 65 tons was effected in the amount of steel required. In the field this particular job was riveted to the supporting columns.

Welding from a Structural Engineer's Viewpoint

If I were asked to sum up the advantages of welding, I believe the following points would cover them in a general way.

1. Steel erected by welding is a silent operation as compared to a job that is riveted.

2. Welded steel presents a neater and cleaner appearance.

3. Welded steel points the way to lower building and construction costs.

4. Welded steel gives a stronger and stiffer construction; trusses that are welded are considerably lighter than riveted trusses designed for the same loading.

5. Welded steel offers opportunity for simplification and improvement of design and detail of members.

6. Structural steel trusses and all other structural pieces may be made by welding without inaccessible parts for painting.

7. Additions and connections can be made to existing structures and members may be easily strengthened by the welding method.

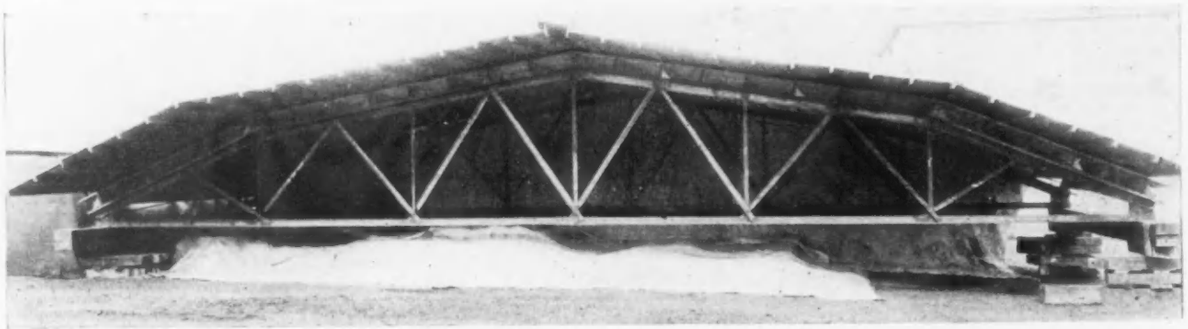
8. Accident hazard is reduced by the absence of falling rivets.

9. The fire hazard has been reduced by the elimination of hot rivets.

10. Alterations, caused by changes or errors, are more easily made by welding.

11. Welding requires simpler and less expensive stagings than riveting.

The complete story of welding would require an article much longer than space would permit in these columns. The above conclusions help materially in explaining why structural steel welding has advanced to its present development, and in my opinion indicates the important position it will occupy in the future.



Familiarity with the methods of successfully welding truss spans was obtained in the earlier days of Austin research by destruction tests of welded and riveted members of similar design. This shows a load of beams being applied for that purpose.

EACH INDUSTRY SHOULD HAVE CONSUMPTION STATISTICS

A PRESCRIPTION for managers for matured standard businesses is the way the author denominates the accompanying article. All manufacturers, he contends, should supply information of sales, for example, to an official who is in the confidence of all the members of the industry. Then the individual in turn may discover from the totals if he is maintaining his place in the industrial procession. The author's suggestion covers what some trade associations are already attempting to do. Others could do something and more of them more.

By JOHN TOMAJAN
General sales manager, Washburn Co., Worcester

THE intelligent operation of any business depends largely upon a fairly accurate knowledge of the extent of the market to be reached. By "market" we do not mean simply the channels of distribution. We mean more particularly the total available consumption of the product in question.

The weak position of most mature businesses today is caused by over-expansion of plant capacity without due consideration of the fundamental question of whether or not the expansion of consumer demand has been in proportion. It would be simple to determine the extent of our efforts and our outlay in inventories, if only we knew the extent of the market we were trying to reach. After all, the most that any manufacturer can hope to do is to supply his share of the available demand. That share is determined not by fictitious factors of only temporary value and importance. It is determined by the position that manufacturer holds with relation to his competitors, that position being determined after a sifting down process extending over a period of years during which the industry in question has been stabilizing itself.

If, therefore, it is possible to know with reasonable accuracy what is the total consumption of any given article, then, by comparing his own volumes with the total consumption, any manufacturer can determine at once whether or not he is gaining or losing ground in the position he holds in that industry.

That information is not readily available because most manufacturers have not sufficient confidence in each other to open their records to each other in order to arrive at that total. Yet, a total of the sales of all the manufacturers in an industry will, for all practical purposes, give the total consumption of that product.

Each Industry Needs an Umpire

The only solution is to have a disinterested outsider—an umpire, or referee, if you please—who is in the confidence of all members of an industry and who has access to all the records of each manufacturer. He will know all about each manufacturer. And while, through him, each manufacturer can find out about the total consumption of the product at any given time, he will not be able to find out about the specific operations of any other manufacturer. In other words, the referee will have a judgment based upon all the facts in the industry. But any individual manufacturer will know only his own volume. That is to say, it is possible for him to know at all times whether or not he is continuing to supply his proportion of the total.

Fortified with such knowledge, the

(Concluded on page 842)

LEAD OLEATE LUBRICANTS FOR

By MAURICE RESWICK
Chief Engineer, Pennsylvania Lubricating Co., Pittsburgh

IN the first article of this series (Aug. 27, page 550) the statement was made that a grease is no better than the mineral oil it contains. Research conducted in the past few years indicates, however, that in "border line" lubricants for extreme conditions of service the reverse may be true, namely, that a mineral oil is no better than the grease compound that it contains.

In the rapid advances made during the past decade in all engineering materials entering into the manufacture of machinery, the oil industry has not kept full pace. The demand for higher speeds and greater pressures in the automotive as well as in the industrial field, was met by the development of alloy steels of greater strength for gears, shafts and bearings, but further progress was impeded by the limiting conditions of existing lubrication practice. The research laboratories of many oil companies were busy, however, on the development of lubricants that would stand up under the intense pressures and high speeds prevailing in machines of modern design. One outstanding result has been the production of a lubricant containing lead oleate, which is believed to meet the new requirements.

The lead oleate material is a "border line" lubricant for critical conditions of pressure and speeds. It maintains an effective film and prevents metal-to-metal contact where ordinary lubricants break down. By the term "border line" is meant the point at which a straight mineral oil breaks down due to pressure and permits the rubbing surfaces to come into metallic contact, resulting in rapid wear, scoring or seizure. In other words, an oil compounded with lead oleate will maintain an effective lubricating film beyond the "border line" or breakdown point of straight mineral oil.

Fig. 1 shows graphically the film strength characteristics of a lead oleate lubricant and clearly defines the lead oleate as compared with a straight mineral cylinder oil. This graph is based upon actual tests, the two lubricants having the same viscosity.

A good lubricating film was maintained with the mineral cylinder oil until the load reached 7000 lb. per sq. in.; at this point the coefficient of friction began to rise rapidly, so that between loads ranging from 8000 to 10,000 lb. per sq. in. the entire film was practically squeezed out. The border line is here indicated therefore at 7000 lb. load. To the left of the border line there was perfect fluid friction; to the right of it lubrication was only partial at first, resulting in semi-solid friction. Hence, we may conclude that with straight mineral oil it is not safe to exceed a unit pressure of 7000 lb. per sq. in.

In the case of the lead oleate compound, while the coefficient of friction was slightly higher from the start, effective lubrication was maintained until a pressure of 45,000 lb. per sq. in. was reached, which marks its limit of capacity before the state of semi-solid friction is approached. In other words, the protection obtained with the lead oleate lubricant, as shown in this test, was more than six times greater than that with a mineral cylinder oil of the same viscosity.

The relative merits of a lead oleate lubricant and a cylinder oil against bearing wear are clearly brought out in Figs. 2 and 3, which illustrate both the test pieces and the test procedure. It will be seen that with the border line lubricant the wear under extreme conditions of load is only a fraction of that with the compounded mineral oil.

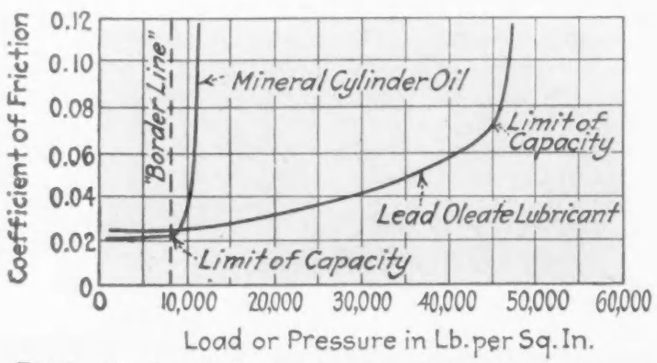


FIG. 1.—Film strength characteristics of two lubricants having the same viscosity.

Lead oleate compound is a composition of highly refined low cost test blended oils, chemically and inseparably combined with pure lead oleate. It should not contain

OR HEAVILY LOADED GEARS AND BEARINGS

"BORDER-LINE" lubricants, particularly those containing lead oleate, developed to meet extreme pressure and speed conditions, are here discussed by Mr. Reswick, whose article on lubricating greases appeared in these columns on August 27.

The lead oleate compound, it is shown, will maintain a lubricating film beyond the break-down point of straight mineral oils. But it has its limitations and should not be adopted indiscriminately; furthermore, being comparatively expensive, its use is not justified where efficient lubrication can be obtained with the usual oils and greases.

lead oxide (litharge), white lead, nor metallic lead powder, but pure lead transformed chemically into an unctuous lead oleate (commonly called lead soap) which is held in intimate combination with the oil.

Elaborate and expensive processes are required in the manufacture of lead oleate compounds in order to eliminate entirely troubles such as separation on standing in the shipping drum and in service. Very little of value can be obtained from an analysis of the constituent elements of a lead oleate compound, as its merits depend not only on the purity and chemical affinity of the ingredients, but to a greater extent on the processing and temperature control during its manufacture.

The efficacy of lead in its several forms, such as white lead, red lead, etc., as a lubricant has long been known. In fact, it is still common practice for millwrights to apply white lead to a "hot" bearing with beneficial results. But it is also known that too great a dose results in abrasion. The problem facing the research laboratories, therefore, was to incorporate into a lubricant the good features of lead as a lubricant and as a strengthener of the oil film and to eliminate the inherent disadvantages of mild abrasion and separation. The modern higher speed and heavier loaded applications of gears (hypoid, spiral bevel, herringbone, etc.) and bearings (plain and anti-friction) operating with little clearance require a lubricant of high film strength and free from abrasive action. This problem is solved successfully in several of the lead oleate lubricants now on the market.

Lead oleate is not the only ingredient which may be used to impart "border line" characteristics to a lubricating oil. Extensive laboratory and field tests have shown conclusively, however, that lead oleate lubricants, when properly made, are the safest to use.

Physical Properties of Lead Oleate Compounds

When made up of low cold test oils, lead oleate compounds can be used without danger of channelling or undue congealing at low temperatures. They are superior in this respect to ordinary mineral oils of the same viscosity. At higher temperatures they stand up as well as straight mineral oil.

Lead oleate compounds are generally manufactured in ten or more viscosities or densities. The lightest grade compares in viscosity with a medium motor oil, while the heaviest grade is of a stiff consistency, so that there is an intermediate grade for every purpose.

In the case of mineral oils, viscosity is perhaps the most important physical characteristic. As the load on the bearing or gears increases, a higher viscosity oil must be used in order to obtain the proper protection. With a lead oleate compound viscosity is also important, but not to the same extent, because it possesses a wider latitude of protection. This is illustrated graphically in Fig. 4, which shows the relative significance of viscosity when referred

to mineral oil and to a lead oleate compound. Let us assume that in a certain gear drive the same lubricant is used for both gear teeth and bearings. The manufacturer's original recommendation, based on his experience with straight mineral oil, is to use an oil of 1500 sec. viscosity at 100 deg. F. Referring to the chart, Fig. 4, it is obvious that the same protection may be obtained with a lighter grade of lead oleate, which has a viscosity of only 500 secs. Saybolt at 100 deg. F. In the chart the line *AB* represents the safe film strength of a 1500-secs. viscosity oil, *AC* represents the film strength of a lead oleate compound of the same viscosity, *BC* represents the difference in film strength between these lubricants at the same viscosity, while line *BD* represents the allowable drop in viscosity when changing from a straight mineral oil to a lead oleate compound.

While no great accuracy is claimed for this diagram, it may be seen that the vertical scale of pressures was so chosen that a mineral cylinder oil of about 1800 sec. viscosity at 100 deg. F. is shown to have a film strength of 7500 lb. per sq. in., which is also the limit of capacity of the same oil as illustrated in Fig. 1. Also the position of the curve for the lead oleate lubricant is such that there is a liberal factor of safety. In applying this diagram to the determination of the correct viscosity of a lubricant for gear teeth, the error entering into the computation of the unit load at the pitch line of the teeth is generally greater than any error in the diagram. Hence this diagram may serve a useful purpose in gear lubrication applications.

The statements made here are not mere theory, but represent the actual tendencies and practice among the outstanding builders of machinery; namely, to specify as light a lubricant as may be consistent with the load, and to rely on the "borderline" characteristics of the lubricant to provide protection instead of specifying a heavy, viscous oil. This is also a step nearer to the ideal lubrication condition which was defined as follows by Gill: "The cardinal principle underlying all lubrication is to use the thinnest (or least viscous) oil that will stay in place and do the work."

A lead oleate lubricant adheres to, or "wets" the rubbing surfaces better than mineral oil, for the reason that it is a compounded and blended product possessing the properties of "oiliness" of the so-called "fatty" or animal oils.

Water-Absorbing Property a Disadvantage

Like other compounded oils, lead oleate lubricants will absorb moisture and form an emulsion with water to a certain degree. In some cases this is a desirable property, but in most cases this characteristic is a disadvantage. When using a lead oleate lubricant of any grade, one should make sure that it will not come in contact with water. Atmospheric condensation may be disregarded in most cases.

As to operating temperature and efficiency, laboratory and field tests have shown that for equal viscosities of a lead oleate lubricant and the highest grade of mineral oil, the operating temperature of the latter lubricant is slightly lower, while the efficiency of the machine is higher with lead oleate compounds. The reason for this has not as yet been determined definitely. However, a lead oleate compound of a lower viscosity than the mineral oil regularly used will give lower operating temperatures and higher efficiency and at the same time assure greater protection. This is particularly true when the machine is operated above its rated capacity and when the gears and bearings are overloaded.

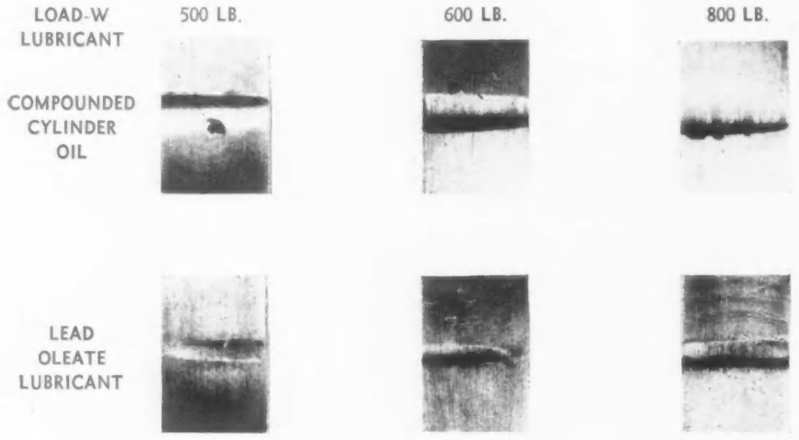


FIG. 2.—Comparison of two different lubricants by results of wear tests on S.A.E. No. 65 bronze. Each of the two pieces was tested for 60 min. at a rubbing speed of 435 ft. per min.

Great care should be exercised in adopting lead oleate lubricants in the industrial field. While this lubricant has undisputed points of superiority, it also has its limitations, especially in regard to its emulsibility characteristics. The main point to remember is that a lead oleate compound is an ideal lubricant for overloaded conditions, where the commonly used oils or greases fail to stand up. Where efficient lubrication is being obtained with common lubricants, there is no justification for recommending a more expensive product like a lead oleate compound. Nearly every plant has isolated cases of excessive wear on gears and bearings due to inefficient lubrication; in such applications lead oleate compounds and their derivatives like special lead oleate greases, will establish for themselves a reputation.

The recommendation of the Society of Automo-

tive Engineers is that for lubrication under conditions where extreme pressures are encountered, special "extreme pressure" (EP) lubricants can be supplied by a number of manufacturers. These lubricants are intended for use where pressures are too great to permit maintenance of "fluid film" lubrication. Lead oleate lubricants come under the class of "extreme pressure" lubricants, provided they are properly made and do not contain solid materials in suspension. Approved types of this lubricant are in extensive use in automobiles, especially in differentials having hypoid gears.

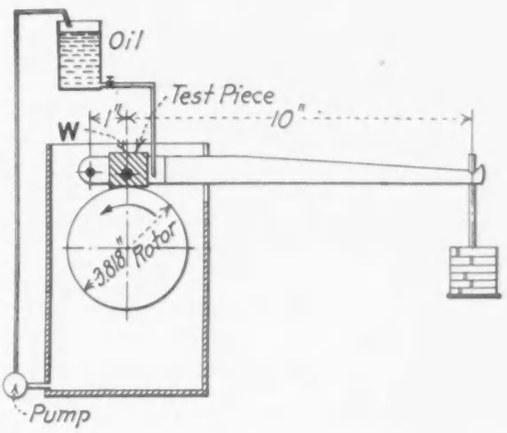


FIG. 3.—Diagram of wear testing machine used on samples shown in Fig. 2. The rotor is of case-hardened carbon steel, 400 Brinell. The same rotor was used in all of the above tests in the order shown, without regrinding. The load at *W* is the total calculated load on the ½-in. wide test piece and is 11 times the beam load.

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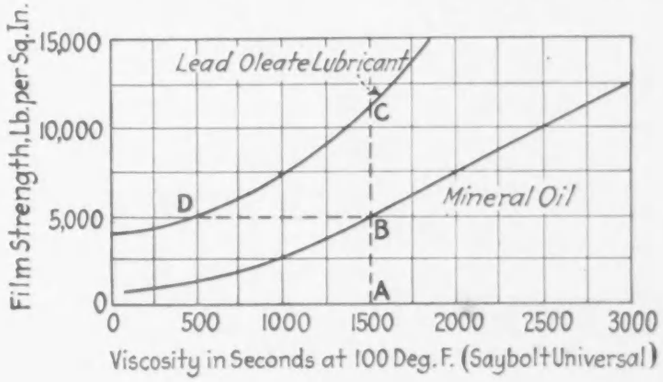

Fig. 4.—(at right) Chart comparing the film strengths of lead oleate lubricants and mineral oils for various viscosities.

Applications Cover a Wide Range

Lead oleate compounds are giving satisfactory service in many fields. Light viscosity material is employed in small fractional horse-power speed reducers, as operating medium in hydraulic feed mechanisms of the Oilgear type, and in special machines requiring an oil of 175 to 350-sec. viscosity at 100 deg. F., and possessing great film strength. Medium viscosity applications include medium sized gear reducer units of the spur, bevel, herringbone and planetary types; inclosed-type chain speed reducers; and in circulatng oiling systems for gears and bearings where there is no water condition.

Of the lead oleate compounds those of heavy viscosity are most used extensively in the automobile and industrial fields. They are employed in worm gears of every size; in reduction gears of every type, including hypoid gears; in flexible couplings of the internal gear sleeve type; in screw-downs on rolling mills; in mechanical crane brakes of disk type, etc.

Extra heavy viscosity lubricants of this type are used widely in the steel industry for the lubrication of rolling mill pinion gears and bearings and for all extra-heavy gears subjected to overload, reversal and shock. This grade can be pumped in cold weather through steam-jacketed pipes and pumps.

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Proper Sand Control and the Low Ductility Problem

(*Concluded from page* 811)

great importance in order to avoid contamination of the metal between the furnace and the mold.

Mr. Hall contended that converter steel is as much subject to embrittlement as acid open-hearth furnace steel. He made laboratory tests from heats free from oxides and silicates, but the addition of aluminum caused embrittlement. He tried pouring metal very hot, but that did not solve the problem. He had a suspicion that it was not alumina but aluminum that caused the trouble.

C. E. Sims, American Steel Foundries, said the shape and position of pin holes supported Mr. Batty's claim. He believed the gas in pin holes is hydrogen. He told of experiments he had made with iron melted in an acid open-hearth furnace and poured into good and bad dry sand molds. Castings made in a mold improperly dried had the worst pin holes. He believed there is no relation between pin holes and ductility and that aluminum is not a cure for pin hole troubles in any steel. He found a distinct relation between microstructure and ductility. Mr. Hall did not agree with Mr. Sims' statement that one could look at steel of 100 diameters magnification and tell which has a low and which a high ductility. He said he would be half right and half wrong.

ONE PER CENT COPPER STEEL HAS DESIRABLE PHYSICAL QUALITIES

By H. B. KINNEAR
Consulting Metallurgist
Marion, Ohio

IN this, the concluding portion of the article by Mr. Kinnear which was published in THE IRON AGE for Sept. 10, the author elaborates on the "jump" in strength and hardness of 1.00 per cent copper steel, on the forgeability of this alloy steel and its ease of production. The valuable bibliography is concluded.

THE characteristic referred to as the "jump" in copper steels first becomes noticeable with a copper content of 0.50 per cent and increases in amount until 0.90 per cent copper is reached after which it very gradually decreases until at 5 per cent copper it is no longer apparent. This point is shown in Table I.

From Table I it may be seen that the increase in physical properties due to reheating a normalized test bar becomes apparent at about 0.50 per cent copper, reaches a maximum at about 0.90 per cent copper and disappears at 5 per cent copper. These tests were run on some of the earlier heats made and the elongation and reduction are not nearly so good as were obtained later when more was learned about the product, both in the open-hearth and electric furnace practice as well as in the heat treatment. Table III shows the physical results of more recent heats.

In experimenting with the low-carbon range several heats were made to determine, if possible, what influence carbon might have on the temperature required for reheating to produce the maximum increase in physical properties and it was found that, for a steel having an analysis of 0.09 per cent carbon, 0.64 per cent manganese and 0.96 per cent copper, a much lower temperature was required to produce the hardening effect than was necessary in working with steels around 0.30 to 0.35 per cent carbon. This fact is shown in Table II.

In comparing the results in Tables I and II it will be noted that the increase in physical properties when the normalized bar is reheated is much greater with low carbons than with the higher carbons and that the temperature necessary to produce this effect is lower for the low carbons; that is, an increase in yield and ultimate strength of about 20,000 lb. may be expected when a low-carbon bar is reheated to 900 deg. F. and an increase of about 15,000 lb. may be anticipated with carbons in the 0.25 to 0.30 per cent range when the bar is reheated to 1000 deg. F. In Table I it will also be noted that the

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TABLE I.—THE VARIATION IN THE "JUMP" OF COPPER STEELS WITH INCREASING COPPER CONTENT

Copper Steel	Yield Point, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In.	Reduction of Area	Brinell
Analysis: 0.50% Cu, 0.41% C					
Normalized at 1550 deg. F.	62,500	99,400	14.0	18.8	187
Normalized 1550 deg. F., drawn 1000 deg. F.	64,430	101,200	18.0	26.4	196
"Jump"	1,930	1,800			
Analysis: 0.76% Cu, 0.32% C					
Normalized at 1550 deg. F.	58,250	90,800	15.5	23.3	174
Normalized 1550 deg. F., drawn 1000 deg. F.	59,750	92,200	18.5	32.5	179
"Jump"	1,500	1,400			
Analysis: 0.94% Cu, 0.29% C					
Normalized at 1550 deg. F.	58,250	88,200	19.0	31.2	179
Normalized 1550 deg. F., drawn 1000 deg. F.	75,700	103,900	20.5	36.4	207
"Jump"	16,450	15,700			
Analysis: 2.72% Cu, 0.31% C					
Normalized at 1550 deg. F.	87,500	105,200	11.0	18.5	217
Normalized 1550 deg. F., drawn 1000 deg. F.	92,250	110,300	14.5	28.5	228
"Jump"	4,750	5,100			
Analysis: 4.98% Cu, 0.32% C					
Normalized at 1550 deg. F.	97,550	118,750	9.0	14.1	255
Normalized 1550 deg. F., drawn 1000 deg. F.	99,000	118,500	11.5	22.3	248
"Jump"	1,450	— 250			

TABLE II.—"JUMP" IN COPPER STEELS OF LOW-CARBON CONTENT

Copper Steel	Yield Point, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In.	Reduction of Area	Brinell
Analysis: 0.09% C, 0.64% Mn, 0.96% Cu					
Normalized at 1650 deg. F.	45,250	70,650	31.0	59.8	143
Normalized 1650 deg. F., drawn 900 deg. F.	68,750	87,650	24.5	57.5	187
"Jump"	22,500	17,000			
Elastic ratio, per cent	78.4				
Analysis: 0.13% C, 0.62% Mn, 1.00% Cu					
Normalized at 1600 deg. F.	50,000	70,000	31.0	54.1	143
Normalized 1600 deg. F., drawn 950 deg. F.	69,750	89,000	23.5	49.7	196
"Jump"	19,750	19,000			
Elastic ratio, per cent	78.3				

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bars were normalized at the unusually low temperature of 1550 deg. F., the copper having lowered the Ar point sufficiently to justify this temperature.

Copper with Molybdenum, Chromium and Other Alloys

From experiments made with other alloys, copper seems to be able to produce the same hardening effect when in combination with such alloys as molybdenum, chromium, vanadium and zirconium, and the copper-vanadium combination compares favorably with cast chrome-vanadium steel except in ultimate strength, in which case the latter is superior. The chrome-copper alloy in rolled sections is now being produced extensively abroad in structural shapes to meet the demand for higher physical properties in this class of material. Table IV shows the physical properties of cast copper-molybdenum, copper-vanadium, copper-chrome and copper-zirconium steels and the effect of reheating the normalized bar.

Copper Steels Can Be Forged

During the course of these experiments the forging possibilities of this material became the subject of considerable interest, and it was thought advisable to forge several large shafts from sand cast ingots in order to learn more about its physical characteristics after being worked. These ingots were sand blasted, cleaned and chipped and then heated to a dripping heat in the forge shop and drawn out into shafts about 9 in. in diameter without the least difficulty.

There was no tendency toward redshortness and, while in one case the surface showed a "wire-netting" effect, this had but little depth and disappeared in rough turning. One of these shafts had an analysis of 0.31 per cent carbon, 0.68 per cent manganese, 0.027 per cent phosphorus, 0.014 per cent sulphur, 0.38 per cent silicon, and 0.95 per cent copper.

After quenching in water from 1550 deg. F. and drawing at 1000 deg. F. the following physical results were obtained:

> Yield point 110, 500 lb. per sq. in., ultimate strength 132,500 lb. per sq. in., elongation in 2 in. 19 per cent, reduction of area 46.9 per cent, and Brinell hardness 255. A section of this shaft drawn at 1200 deg. F. showed: Yield point 97,750 lb. per sq. in., ultimate strength 113,250 lb. per sq. in., elongation 21 per cent, reduction 61.1 per cent, and Brinell hardness 228.

This material necks down much the same as chrome-vanadium test pieces and the fracture resembles these greatly.

These forging tests leave but little doubt that this material could be rolled into structural shapes and rounds for shafting without a great deal of trouble and produce a much better product than the above forged shafts, due to a better refinement of the interior of the piece resulting from the rolling operation.

Copper Steels Easy to Make

The manufacture of copper steel differs but little from that of any other steel made for casting. The copper may be added either to the ladle or to the bath, but it is preferably added to the latter after the lime is up and the slag is thinned out. However, when this addition is made to the bath a rapid drop in carbon will be noted, so that it is well to make the addition early while there is plenty of carbon present in the metal.

Copper may be added as pig, borings or compressed wire without fear of losing any of it in the slag. Any copper oxide formed will be immediately reduced by the carbon in the bath

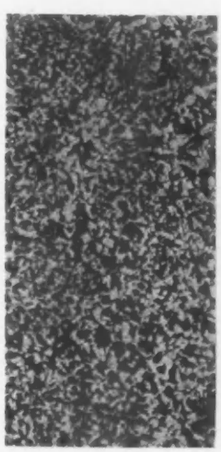

FIG. 10

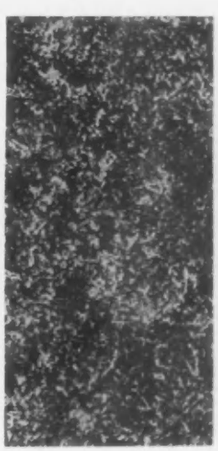

FIG. 11

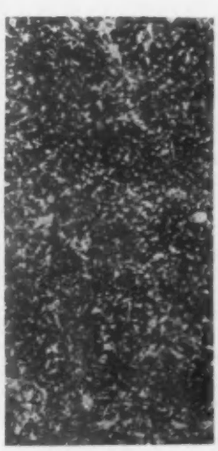

FIG. 12

FIG. 10.—A 4.98-per cent copper steel with 0.32-per cent carbon and 0.69-per cent manganese, normalized at 1550 deg. F. 100 diameters.

Fig. 11.—Same steel as Figs. 1 and 2, quenched in water at 1550 deg. F. and drawn at 1100 deg. F. 100 diameters.

Fig. 12—Same steel as Figs. 1 and 2, quenched in water at 1550 deeg. F. and drawn at 700 deg. F. 100 diameters.

or by the iron itself, since the heat energy of oxidation of copper oxide (Cu_2O) is much less than that of ferrous oxide (FeO); in fact, it is much less than manganese oxide (MnO), silica (SiO_2) phosphorus pentoxide (P_2O_5) or nickel oxide (NiO), if present, and for this reason it is very doubtful if copper oxide can exist as an inclusion in cast steel.*

All copper added to the furnace will be found in the metal and due to this fact the copper in the gates and risers and in the foundry scrap will be recovered on remelting. This point is of considerable importance when costs are taken into account. In cases where the foundry scrap constitutes half of the furnace charge, only 9 to 10 lb. of copper per ton is required to produce 0.90 per cent copper steel. The manganese addition must be made to the bath and the silicon addition to the ladle. There is nothing unusual about the casting of copper steel except, possibly, the beautiful green flame coming from the molds.

The copper addition itself is not responsible for any of the numerous defects that steel castings are heir to. Shrinkage cracks are encountered to no greater extent with copper steel than with any other kind and there are less cold checks with it than with some steel that has come to the writer's attention.

*Heat energies of oxidation in kilojoules: SiO_2—415; MnO—380; P_2O_5—306; FeO—268; NiO—245; Cu_2O—167.

Conclusions

The following conclusions are arrived at:

1.—One per cent copper cast steel, carbon 0.25 and 0.30 per cent, has a very high elastic ratio and excellent ductility when heat treated.

2.—There is no evidence of redshortness in shafting forged from sand cast ingots of 1 per cent copper steel low in sulphur.

3.—Copper steels bearing between 0.50 and 5.0 per cent copper show an increase in physical properties and give evidence of precipitation hardening when the normalized bar is reheated to temperature between 900 and 1050 deg. F.

4.—Copper lowers the Ar_3 point.

5.—Copper in steel or gray iron produces fine grained structure.

The author gratefully acknowledges the valuable counsel and advice of Prof. D. J. Demorest, professor of metallurgy, College of Engineering, Ohio State University, Columbus.

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BIBLIOGRAPHY AND SYMPOSIUM ON COPPER ALLOY STEELS

Wigham (1906). *Journal* of Iron and Steel Institute, 1906, Vol. I, page 222. The steel used in these experiments was made in the open-hearth furnace and ranged in copper content as follows: 0.028, 0.192, 0.422, 0.604, 0.85 and 1.02 per cent while the other elements averaged carbon 0.49, manganese 0.45, sulphur 0.025, phosphorus 0.023 and silicon 0.075 per cent.

All of these steels were hammered down to billets and worked perfectly. The steels having 0.85 and 1.02 per cent copper showed some slight tendency to crack but, when cooled down, welded together and could not be distinguished from the others, indicating that copper steels of this content might need to be forged at a lower temperature. In rolling down to rod for wire drawing, all of the samples rolled without difficulty and after annealing were particularly satisfactory in elongation and bending tests, and the tensile and torsion tests were much higher than the standard steel having no copper present. The author concludes that copper over 2 per cent is difficult to alloy with steel without the use of aluminum. More copper could be alloyed provided it were added to the furnace charge rather than added after the charge is converted into steel.

Muller (1906). Welding, *Stahl und Eisen*, December, 1906. Muller, Germany, established the fact that copper steel having 0.14 per cent carbon alloyed with all proportions of copper, that is, within certain limits, diminishes the tendency toward redshortness, raises the fluidity, and increases the hardness and tensile strength.

Campbell (1907). "The Manufacturing and Properties of Iron and Steel," 1907, page 358. Campbell says that copper steels with 0.08 to 0.10 per cent sulphur will crack in rolling and that the higher copper steels have a

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TABLE III.—PHYSICAL PROPERTIES OF MORE RECENT HEATS OF COPPER STEEL

C	Mn	Cu	Yield Point, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation, Per Cent in 2 In.	Reduction of Area, Per Cent	Brinell
0.26	0.60	1.08	80,100	104,500	23.0	50.5	228
0.27	0.62	0.97	77,250	100,500	22.0	43.0	223
0.29	0.65	1.02	78,050	98,750	22.0	41.8	217
0.22	0.66	0.92	75,150	100,450	23.0	52.2	208
0.24	0.68	...	77,750	102,000	24.0	51.4	217
0.26	0.73	0.35	74,000	100,500	23.0	49.2	207
0.33	0.74	1.02	79,100	106,900	20.0	39.7	197
0.24	0.74	1.03	77,950	97,650	22.5	46.0	187
0.30	0.72	1.01	78,850	105,150	21.0	46.0	187
0.23	0.75	0.95	75,500	101,000	21.0	46.0	197
0.29	0.74	0.96	77,150	103,250	21.0	41.6	197
0.22	0.75	0.95	68,500	94,500	25.0	51.9	207
0.30	0.75	0.99	77,100	105,800	22.5	48.6	197
0.31	0.70	0.93	73,800	104,000	22.5	48.9	197
0.29	0.72	0.94	71,150	99,750	23.5	44.3	207
0.29	0.79	0.94	76,400	102,000	21.5	47.4	207
0.24	0.64	1.00	68,200	92,300	26.0	50.3	207
0.28	0.61	1.02	72,400	97,500	24.0	42.4	207
0.26	0.64	0.95	73,250	99,500	21.5	40.7	207
0.25	0.63	1.03	71,550	94,100	22.5	44.3	207
0.24	0.68	1.00	71,250	96,250	22.0	44.9	207
0.26	0.64	0.95	70,000	98,500	22.5	47.4	207
0.21	0.61	0.90	68,550	91,000	26.0	45.1	217
0.23	0.64	0.97	74,400	97,250	23.0	45.1	223
0.29	0.64	0.99	73,700	98,700	21.5	44.0	207
0.24	0.65	0.93	75,150	99,200	22.0	48.0	207
0.28	0.68	1.07	78,750	105,600	22.0	48.4	207
0.33	1.04	0.95	90,000	123,500	19.5	38.8	228

TABLE IV.—ANALYSES AND PROPERTIES OF BINARY COPPER ALLOY STEELS

	C	Mn	Cu	Mo	Cr	V	Zr	Yield Point, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In.	Reduction of Area	Brinell
Copper-molybdenum	0.26	0.73	0.88	0.36	...	...	...					
Norm'l'd 1550 deg. F.								59,750	101,900	17.5	24.4	196
Norm'l'd 1550 deg. F. and drawn 1000 deg. F.								79,000	104,000	22.0	41.0	217
Copper-vanadium	0.29	0.72	0.89	...	...	0.20	...					
Norm'l'd 1550 deg. F.								69,500	99,800	18.0	30.5	192
Norm'l'd 1550 deg. F. and drawn 1000 deg. F.								81,700	106,750	21.5	43.7	212
Copper-chromium	0.35	0.73	1.02	...	0.63	...	...					
Norm'l'd 1550 deg. F.								70,750	107,500	17.5	27.5	207
Norm'l'd 1550 deg. F. and drawn 1000 deg. F.								88,350	122,000	17.5	30.2	228
Copper-zirconium	0.32	0.70	1.04	...	...	...	0.22					
Norm'l'd 1550 deg. F.								68,250	101,000	16.5	21.3	187
Norm'l'd 1550 deg. F. and drawn 1000 deg. F.								87,400	115,300	13.0	16.3	228

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higner elastic ratio and better elongation and reduction of area.

Breuil (1907). *Journal* of Iron and Steel Institute, 1907, Vol. II. The fact has been established that a copper steel remains commercially serviceable up to about 4 per cent copper. His conclusions follow:

1.—Copper steel exceeding 4 per cent copper cannot be rolled.

2.—In ingot state copper hardens steel inversely as carbon content.

3.—Copper lowers Ar_3 and Ar_2 in soft steel and it intensifies the Ar_1 point to a marked degree.

4.—Tensile strength in soft (low-carbon) steels increases as copper increases.

5.—Annealing beneficial.

6.—Copper steels are the equal of nickel steels in tensile and are cheaper.

7.—Copper steels are the equal of nickel steels in shock tests; 0.16 per cent C, 4 per cent copper remarkable in this connection.

8.—Copper steels are capable under torsional tests of undergoing a considerable degree of deformation.

9.—Hardness of copper steels follows the same law as the tensile strength.

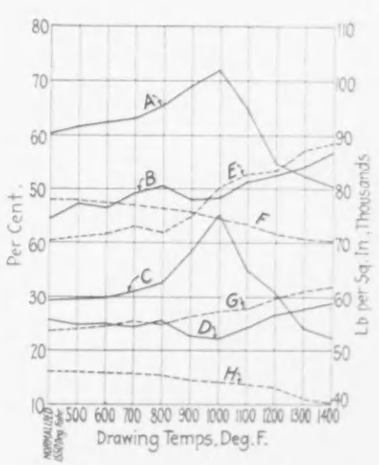
10.—Presence of copper makes steel finer grained. While hardening the steel the presence of copper does not make it brittle. It confers excellent elasticity while leaving the elongation good and produces a most valuable metal.

Sahman (1908). *Journal* of Iron and Steel Institute, 1908, Vol. I, page 409. Ibid. Vol. 57, pages 1-33. The author finds that iron and copper are completely miscible in the fused state and that there are two series of mixed crystals from 0 to 3.50 per cent copper and from 97.3 to 100 per cent copper by weight.

Burgess and Aston (1909). *Trans.* Amer. Elec. Chem. Soc., 1909, pages 241-256. THE IRON AGE, Vol. 84, pages 1476-1479. In view of the work by previous observers to the effect that the influence of copper varies with the amounts of carbon and sulphur present, the author's investigations were made on samples in which these elements were held at a minimum. Alloys containing up to 2 per cent copper forged well at low heats but with 2 to 7 per cent they forged poorly at low heats. From 7 to 80 per cent copper they may be classed as non-forgeable. With less than 5 per cent copper present the alloys weld easily and all alloys welded in an electric welder up to 7 per cent copper. Hardness and tensile strength increased with added copper content. Electrolytic iron and electrolytic copper used in making alloys.

Clamer (1910). *Journal* of Iron and Steel Institute, 1910, Vol. II, page 515. Amer. Soc. Testing Mat., June, 1910. This investigation was made on iron-nickel, iron-copper and iron-nickel-copper alloys. Steel containing from 5 to 20 per cent copper, and which is hard, brittle and hot-short, becomes highly ductile and forgeable by the addition of 20 to 50 per cent nickel. It was found that nickel in nickel steels could partly be replaced by copper without changing physicals.

Sargent (1912). Electro-Chem. and Met. *Journal* 1910, page 68. In commenting on the above paper Mr. Sargent is of the opinion that the degree of redshortness varies with the conditions of manufacture and the presence of other elements. A photograph of two rolls of narrow strip containing 0.5 per cent copper and under 0.10 per cent carbon and 0.12 per cent manganese shows a tendency to crack at the edges. Sargent thinks copper oxide is responsible for the redshortness of copper-bearing steel. Note: It is quite possible that these strips were rolled in the critical range of this low-carbon, low-manganese steel and therefore cracked at the edges much the same as American ingot iron and, if they had been rolled above or below this range, they probably would not have cracked.



Physical properties of copper steel and carbon steel compared

Editorial. *E. and M. Journal*, 1912, Vol. 94, page 677. The author commented on the remarkable durability of some rails used on the New Haven Railroad containing 0.50 per cent copper. Rails containing 0.50 per cent copper have been used for some time.

Buck (1913). *Journal of Indus. and Eng. Chem.* June, 1913, page 447. Buck (1913) ends an investigation showing that copper-bearing steel, 0.15, 0.24 and 0.34 per cent withstands atmospheric corrosion twice as well as steels free from copper.

Burgess and Aston (1913). *Journal of Indus. and Eng. Chem.* June, 1913, page 458. They investigated the corrodibility of a series of electrolytic iron and copper, 0.89 copper to 7.05 per cent copper, and found that the whole series resisted the attack of acid and atmosphere better than plain carbon steels.

Clevenger and Ray, Palo Alto, Cal. "Influence of Copper on the Physical Properties of Steel." *Trans.* Amer. Institute of Mining Engineers, Vol. 47, 1913. Hardening effect of copper on steel due to two distinct causes: 1.—It retards the formation of pearlite. Hence there is more diffused cementite, thereby making the constituent of the steel finer. 2.—It hardens the ferrite by forming with it an alloy which is harder than the ferrite alone.

Conclusions on above paper: 1.—In making copper steel it is necessary to kill the steel before adding the copper and the addition of alloy before pouring is advisable. 2.—In forging the ingots, 0.44 to 0.60 per cent carbon, traces of redshortness began to show at a copper content of 4.512 per cent. Up to this point the steel forged about like machine steel. 3.—Up to 0.846 per cent copper the steels welded well and above 1.87 per cent the steel would not weld due probably to a film of copper oxide forming on the heated surface. 4.—There seems to be a marked tendency for copper to eliminate sulphur. (Stead has shown that the amount of copper that a steel will take up depends upon the carbon content and varies inversely as the carbon content. Many investigators neglected to take into consideration the sulphur content of their product and attributed the redshortness to copper rather than to sulphide of copper which could not have existed had the sulphur content been lower.) 5.—Segregation in ingots is slightly no-

ticeable at 1.0 per cent and at 2.73 per cent is more noticeable, and at 4.5 per cent is very marked. 6.—Copper up to 0.493 per cent inhibits corrosion in dilute H_2SO_4 but as the copper content increases this characteristic decreases (that is the higher the copper, the less the resistance to corrosion) until at 2.73 per cent the steel rusts faster than plain carbon steel. 7.—As the copper increases the grain becomes finer due to the more even distribution of fibrous cementite. 8.—Ar_1 point lowered from 730 deg. C. in steel without copper to 635 deg. C. in steel containing 4.5 per cent copper. 9.—Elastic limit increases steadily in both annealed and unannealed specimens until with 4.5 per cent copper the elastic limit was 100 per cent greater than steel containing no copper. Ultimate strength increases directly as the copper percentage. In the annealed specimens the elongation although irregular decreases with the copper content up to 1.87 per cent and then increases and reaches a maximum at 4.5 per cent copper. 10.—Hardness increases directly as the copper content.

L. Grenet (1917). Grenet found that copper increases the depth of hardening in steel and that the influence of copper in the presence of carbon is marked. One per cent copper in a steel containing 1.60 per cent carbon increases the depth of hardening effect.

C. R. Hayward and A. B. Johnston. Bulletin of the Amer. Institute of Mining Engineers, No. 133, 1918, pages 159-167. This paper deals with medium-carbon steel having a copper content of 0.05 to 0.86 per cent and less than 0.40 per cent carbon and concludes that the high-copper steels are decidedly superior and much higher in tensile strength and elastic limit with about the same elongation (ductility). The high-copper steels were harder and gave a better impact test and confirmed the previous statement of Stead that copper steels resembled nickel steels. High copper also finer grained.

E. A. Richardson and L. T. Richardson. *Chem. and Met. Eng.* 24, page 565 (1921). Copper added to iron produces redshortness over a certain temperature range and this redshortness is removed by the addition of manganese or chromium depending on the amount of copper present. Copper added to steel does not cause redshortness, at least up to 3.50 per cent.

R. V. Bingay. *Electrical World*, Vol. 78, page 425, 1921. Some advantages claimed for copper alloy steel. Sheets of copper steel (0.25 per cent copper) exposed to the Pittsburgh atmosphere for six months lost about 1.17 oz. per sq. ft. as against 5.53 oz. for plain steel exposed at the same time. Paint adheres better to copper steel than to ordinary steel. Copper steel welds better and is more malleable than plain steel.

J. R. Cain. Paper read before American Electrochemical Society, October, 1924. "Influence of Oxygen, Sulphur, Manganese and Copper on Redshortness of Iron." Cain found that in order to avoid redshortness not over 0.01 per cent sulphur should be present; 0.20 per cent oxygen does not cause redshortness. Manganese may prevent redshortness if present in amounts equal to three times the sulphur. Copper, 0.05 to 0.50 per cent, of minor importance in its effect on redshortness but in some instances tended to decrease redshortness.

H. B. Kinnear. Nov. 16, 1926 granted U. S. patent No. 1,607,036. Inventor discovered that steel containing copper from 0.50 to 5.0 per cent (preferably 0.90 per cent copper) gave evidence of a form of precipitation hardening. If two bars were normalized at 1550 deg. Fahr. and one bar pulled in the normalized condition and the other reheated to 1000 deg. F. and cooled and pulled, the reheated bar would show a marked increase in yield, ultimate strength and Brinell hardness. The difference in the physical properties between a normalized bar and a normalized and reheated bar became greater as the carbon decreased.

P. B. MiKailof. *Viesta. Metallspromyehl* No. 9 and 10, pages 5-21, September, October, 1926. *Chimie et Industrie*, Vol. 18, page 453, 1927. "Resistance to Corrosion and Mechanical Properties of Gray Iron Containing Copper." The author reaches the following conclusions: (1) The addition of not over 1.30 per cent copper does not lower the density and homogeneity of the iron; (2) it does not lower its strength but lowers its *brittleness;* (3) additions of 0.70 per cent or more of copper appreciably increases the hardness; (4) 0.50 to 1.70 per cent copper considerably increases its resistance to corrosion by H_2SO_4, HCL, AcOH and NaCL solutions; (5) Copper dissolves completely in gray iron to form solid solutions, which improves the resistance to corrosion and the mechanical properties; (6) Copper does not affect the structure of gray iron with high silicon content, but it hinders the formation of cementite when the silicon content is low. (C. A. 22-376.)

Persoz L. *Aciers Speciaux et Leurs Emplois*, Vol. III, No. 34, 1928. Translation appears in *Foundry Trade Journal*, Vol. 40, March 7, 1929. "Effect of Principal Additional Elements in Steels." Copper—until recently this element was considered an impurity in steel but has been found to enter the ferrite and raise the elongation. Copper retards the transformation point of steel and in conjunction with nickel and chromium increases the quench penetration.

A. F. Stogoff and V. S. Meskin. *Arch. Eisenhuttenw*, Vol. II, November, page 321 (1928). Previous investigations of low-carbon, copper steels are briefly reviewed. The properties of steels 0.69 to 1.22 per cent carbon and 1.19 to 5.07 per cent copper are studied. Copper increases the magnetic properties of steel; the critical point is lowered (to 1184 deg. F. for 5 per cent copper) and it causes a large temperature hysteresis but without affecting the carbon content of the pearlite. Quenched and tempered copper steel shows a high percentage of elongation and hardens with relatively good ductility and compressive strength. As the copper increases the coercive force of heat-treated steel, it may be assumed that copper in the steel is not present in the free state. (C. A. 23-4177.)

A. F. Stogoff and W. S. Messkin. *Archiv. für das Eisenhüttenwesen*, 1928, Vol. II, November, pages 321-331. Above experimented with copper contents 1.19 to 5.07 per cent and carbon 0.74 to 1.22 per cent Ar_1 point lower by copper addition but pearlite unaffected. Elastic limit, tensile strength and hardness all increase with increase of copper while the elongation and reduction fall off. Copper steels quenched and drawn show high tensile properties with good elongation and reduction of area.

Winfield C. Hamilton and Clarence E. Sims (to American Steel Foundries) U. S. patent No. 1,742,857, Jan. 7, 1930. Steel car wheels. Car wheels are formed of a high-manganese pearlitic steel containing 0.5 to 2.0 per cent copper. (C. A. 24-1074.)

J. A. Jones. *Journal* of Iron and Steel Institute, 1930, Vol. I, page 209. "On Chromium-Copper Structural Steels." In an earlier paper by the author the effect of carbon, manganese, silicon and nickel on the properties of structural steels was investigated and it was concluded that the type giving the best results was that having carbon 0.30, manganese 1.30 and silicon 0.90 per cent; however, many difficulties were encountered in the production of plate from the high-silicon material, and in the discussion reference was made to the development of a German structural steel having none of the disadvantages encountered with the high-silicon product. The composition of this steel is carbon 0.15 to 0.18 per cent, silicon 0.28 per cent, manganese 0.80 per cent, chromium 0.40 per cent and copper 0.50 to 0.80 per cent. In his experiments Mr. Jones so adjusted the manganese, chromium and copper contents to produce a steel of high proportionality accompanied by good ductility.

The best properties were obtained in the steel containing carbon 0.31, manganese 0.46, silicon 0.07, chromium 0.88 and copper 1.17 per cent. The physical properties of this steel are much better than those of the usual type of high-manganese structural steel and compare favorably with the best manganese-silicon steels as shown in following table:

	High-Manganese		Cr-Cu	
	Longitudinal	Transverse	Longitudinal	Transverse
Elastic limit, tons per sq. in.	19	18	21	19
Yield point, tons per sq. in.	24	23.8	26.8	27
Maximum load, tons per sq. in.	40.8	41.3	41.3	41.5
Elongation in 2 in., per cent	33	29	34	32
Reduction of area, per cent	67	58	72	60
Izod impact				
Notch parallel to surface	53	31	97	63
Notch perpendicular to surface	43	27	88	35

The chromium-copper steels offer a further advantage in their resistance to atmospheric corrosion and no objection has been raised to difficulty of manufacturing.

WIRE MILL COST ACCOUNTING

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WIRE mill cost accounting was discussed at a recent meeting of the Wire Association by L. D. Granger, chief metallurgist of the Wickwire Spencer Steel Co., New York. He exhibited a typical cost sheet filled in with hypothetical figures to help make his points. This is here reproduced.

The sheet covers the cost of annealing 350 net tons of No. 11 gage material. What he had to say in explanation is in part as follows:

If our annealing house has a capacity of 750 tons, we see at a glance that it was running at less than 50 per cent of capacity. This prepares us for a higher unit cost, or cost per ton, than as if we were running at 75 to 80 per cent of full load.

Item 1 is the direct labor paid, which should be defined clearly to include all those employees who are so considered. We may call firemen direct labor and ash wheelers indirect, or both may be termed indirect, and only the loaders and strippers called direct. It is of little importance as long as we know what the classifications are and can locate each man's time, unless we are to compare our costs with some other mill, in which case the classification must be identical in all mills.

In sequence follow the various items of indirect labor, ending in a total labor figure. (Line 6.)

Then from our stores reports and expense vouchers come items 7 to 25 with as many of the items reported as are used in the process. This being a universal sheet, we would expect to see acid and inhibitors reported on the cleaning sheet, but not on that for annealing, and so on.

Repairs and maintenance are then reported separately for purposes of emphasis and control and then comes in item 31, the lump sum charge for "plant burden." This is something that the foreman cannot control, as it includes salaries of general company officials, general accounting departments, and, in short, the general expenses of running the business. For an auditor or controller, these expenses may all be detailed and opened to analysis, but the fore-

WIRE MILL COST SHEET, AS FILLED IN TO COVER COST OF ANNEALING

	Amount	Cost per Ton — Actual	Cost per Ton — Standard	Variation — Over	Variation — Under
1 Direct Labor	$420.00	$1.20	$1.25		$0.05
Indirect Labor					
2 Supt., foremen, clerks, etc	24.50	.07	.06	$0.01	
3 Janitors, sweepers	3.50	.01	.015		.005
4 Miscellaneous	7.00	.02	.015	.005	
5 TOTAL INDIRECT LABOR	35.00	.10	.090	.01	
6 TOTAL LABOR	455.00	1.30	1.34		.04
Indirect Supplies and Expense					
7 Tools and supplies	17.50	.05	.05		
8 Lubricants	.70	.002	.003		.001
9 Electric light and power	10.50	.03	.035		.005
10 Steam					
11 Water					
12 Miscellaneous supplies	.35	.001		.001	
13 Liability insurance	6.30	.018	.02		.002
14 Acids					
15 Lime					
16 Inhibitors					
17 Dies					
18 Tubs					
19 Coal and gas	885.50	2.53	2.45	.08	
20 Fuel oil					
21 Trucking	87.50	.25	.30		.05
22 Department burden	70.00	.20	.20		
23 Stores expense	10.50	.03	.05		.02
24 Packing supplies					
25 Laboratory					
26 TOTAL INDIRECT SUPPLIES AND EXPENSE	1088.85	3.111	3.108	.003	
Repairs and Maintenance					
27 Labor	35.00	.10	.15		.05
28 Material	7.00	.02	.03		.01
29 Burden	14.00	.04	.05		.01
30 Total Repairs and Maintenance	56.00	.16	.23		.07
31 Plant burden	175.00	.50	.45	.05	
32 COST ABOVE LABOR	1319.85	3.771	3.788		.017
33 TOTAL COST	$1774.85	$5.071	$5.128		.057

	Amount	Tons
34 Distribution		
35 Rod frames H. C.	$25.36	5.0
36 Rod frames L. C.	1274.34	251.3
37 15 frame H. C.		
38 15 frame L. C.	153.14	30.2
39 Coarse wet H. C.	83.67	16.5
40 Coarse wet L. C.	136.92	27.0
41 Galvanizing	101.42	20.0
42 Tinning		
43 TOTAL	$1774.85	350.0

man must simply take it as given him, and, of course, cannot be held responsible for its amount.

Item 22, department burden, is the share of the plant salaries, taxes, insurance, etc., to be borne by the department. This figure also is out of the control of the foreman, but partly under the supervision and responsibility of the plant superintendent.

Line 33 gives us our total cost, which is then distributed for the purpose of making up further cost sheets, as shown in lines 35 to 42. These distributions cover shipments to any departments which receive annealed wire, and will appear on their respective cost sheets as part of the cost of the finished wire.

In the column headed "Amount" is recorded the actual money in dollars and cents spent for each item and then under "cost per ton" we get the real significant figures with which we have to work, and which show us what the operation actually cost.

If, however, we have only the actual costs reported, we can tell only from comparisons with the costs of former months whether our current operation has been better or worse. This takes time, and it is hard to average a lot of figures in one's head so we now prepare the "standard" column, which tells us what each item ought to cost under normal conditions, and we thus provide a direct means for seeing just how good or how bad our performance really has been.

The preparation of a set of standards is no easy matter. It is usually done by averaging actual costs over a period of months at normal production, and then setting more or less arbitrarily a figure for each item, the actual value of which is finally determined by the exercise of a certain amount of common sense. If conditions are known to have been out of line, during the period observed, the standard or expected cost is influenced accordingly.

Now, by filling out the variation column—usually done in black for under standards, and red for over—we add up the differences and see by how much we either failed to meet our expected costs or succeeded in beating them item by item. Furthermore, we can see in just what items or classifications we were deficient, and single them out for further study and correction.

On the sheet shown, we were under standards by 5.7c. a ton or 1.1 per cent. This would be considered very good practice, but we would probably not be satisfied with it as some items are over standard, and would look first into our fuel costs. If the standard is properly set we would try to reduce this item the next month.

We are 5c. over on plant burden. If our production is up to normal, we can only pass this by, and hope that the management will either reduce expenses or change the standard, or, if we have enough business, we will try to increase the production of the department sufficiently to meet the conditions set.

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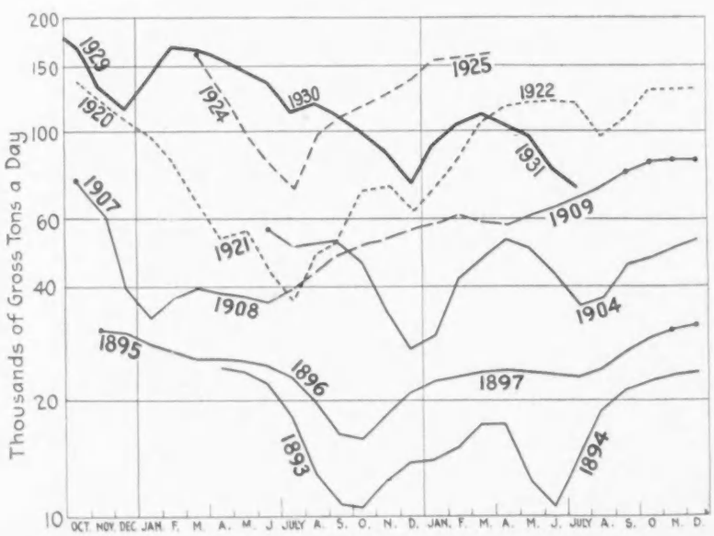
This and Other Recessions in Steel

LAST October THE IRON AGE published a chart in which recessions in ingot output over a number of periods of depressed business were shown. On this page the same chart is reproduced, modified only in its showing of the curve for the current depression. At the present stage, using the July figures, now available, the decline in tonnage from the peak reached in June, 1929, has been no less than 63 per cent.*

Instead of being the least severe of the seven recessions depicted in the chart, as it was a year ago, it follows that the present one has become, with a single exception, the most severe of all. That exception is the depression in 1921, which carried production to a point 76 per cent below the maximum previously reached.

For the purpose of comparison it may be stated that the 1893 depression carried production down 59.5 per cent from the previous maximum; that in 1924 went down 55.4 per cent; that in 1908 dropped 55.3 per cent; the one in 1903 went down 51 per cent and the decline in 1896 carried the figure 47.9 per cent below the previous high. The durations of recession varied considerably.

*August figures drop this further to 66.3 per cent.



SEVEN depressions in four decades, of which only one was deeper than the present. Subsequent recoveries from the bottom to a high rate of operation have averaged about 15 months. This ratio chart shows proportional movements.

Zürich Congress of New International Association for Testing Materials

SESSIONS of the new International Association for Testing Materials were held at Zürich, Sept. 6 to 12, inclusive, with an attendance of some 500 members. The meetings were held in the buildings of the Swiss Federal Technical High School.

The general atmosphere of the meetings was very much like that of the American Society for Testing Materials, with the exception of the use of three languages—French, German and English—and the absence of discussion of definite specifications and of detailed standards of methods of testing. The International Association does not put out definite specifications; noting the difficulties imposed by the use of different languages, and the differences in various national viewpoints, this general policy seems justified.

However, the need for uniformity, especially for nomenclature, was very evident, and the congress adopted the policy of allowing each of the four sections to appoint "reporting committees" who may review the papers and discussions, and present a report on the degree of uniformity which exists. Several such committees were appointed at this congress.

OFFICERS of the New International Association for Testing Materials, and the new officers elected at Zürich, are:

President of the Association, Prof. A. Mesnager, Paris; new President, Dr. W. Rosenhain, England.

President of Group "A" (Metals) Dr. W. Rosenhain; new President not chosen yet.

President of Group "B" (Inorganic non-metals) Prof. M. Ros, Switzerland; new President, Prof. E. Suenson, Denmark.

President of Group "C" (Organic Materials) Prof. J. O. Roos, Sweden; new President, Dr. Dachter, Germany.

President of Group "D" (Matters of General Interest) Prof. W. Von Mollendorf, Germany; new President, Dr. G. K. Burgess, United States.

Secretary of the Association, Prof. M. Ros, Switzerland, who continues in office.

Division into Four Groups

The work of the congress was carried on through four sections: Metals, under the chairmanship of Dr. W. Rosenhain of England; Non-metallic Inorganic Materials, under the chairmanship of Prof. M. Ros, director of the Swiss Federal Materials Testing Station; Organic Materials, under the chairmanship of Prof. J. O. Roos of the Swedish State Materials Testing Station; and Matters of General Importance, under the chairmanship of Prof. W. von Mollendorf of the German Association for Testing Materials, who was represented at this congress by Dr. P. Goerens of the Krupp works.

Five sessions of the Metals section were held, which considered (1) Cast Iron, (2) Metals at High Temperatures, (3) Fatigue of Metals, (4) Notched-Bar Impact Test for Metals, and (5) Metallography. A valuable feature of each session was the summary after the discussion, given by Chairman Rosenhain.

The session on cast iron listened to papers by J. G. Pearce, director of the British Cast Iron Research Association, Prof. E. Piwowarsky of the Technical High School at Aachen, Prof. A. Portevin of the School of Foundry Work of Paris, W. Pisek, director of the Bohemian Testing Laboratory for Foundry Practice at Brünn, and E. Dubi, director of the Iron Works of Ludwig at Gerlafingen, Switzerland.

Many Men Thinking Alike

There was a remarkable degree of unanimity in the views presented. The use of tensile tests, shear tests, banding tests, chemical tests, hardness tests and metallographic examination was discussed. There was general agreement that mechanical tests of test coupons are valuable in determining relative strengths of different melts of cast iron, but that the use of test results to determine allowable stresses in cast iron members is surrounded by many difficulties, on account of the effect of size of castings and the effect of increase of size of graphite flakes in large castings. The corrodibility of ordinary cast iron and of the new alloy cast irons was given consideration.

Preference for the bending test was expressed by several members, and the German bending specimen and the American arbitration bar seemed to be the most highly regarded test specimens. The need for standardization was strongly felt. A committee to summarize opinion on this point was appointed, although under the rules of the International Association this report will not recommend any obligatory standards.

Testing Creep at High Temperatures

Before the section on Strength of Metals at High Temperatures, papers were presented by Prof. J. Galibourg of the Central School of Arts and Manufactures at Paris, by Dr. A. Pomp and Dr. W. Enders of the Kaiser Wilhelm Institute for Research in Iron at Düsseldorf, and by Messrs. Batson and Tapsell of the British National Physical Laboratory at Teddington. The paper by Professor Galibourg expressed hope that a delicate short-time test might be developed which would be effective in determining a practical limit of "creep" at high temperatures, and the paper by Dr. Pomp and Dr. Enders proposed a short-time test.

On the other hand, the paper by Messrs. Batson and Tapsell expressed the opinion that, at present, tests of some 40 days are necessary to give satisfactory results with measurements of creep to one one-hundredth of an inch per inch of gage length of specimen. The opinion was expressed that short-time creep tests, while they may serve to determine initial creep, are not reliable for the de-

termination of resistance to creep under prolonged loading.

The phenomena of intercrystalline cracking under prolonged steady load was noted, and the opinion expressed that this is quite different from the phenomena of creep, and that different test methods are necessary in studying it. In the discussion the importance of this intercrystalline cracking was questioned and defended. Dr. Pomp and Dr. Enders offered an explanation of the phenomenon of "stiffening" (gradual reduction of rate of creep with time) as being due to "aging."

The papers and the discussion following emphasized the desirability of a short-time test for creep under high temperatures, and the unsatisfactory status of such tests as have been proposed. In the discussion the report of the A. S. T. M.-A. S. M. E. Joint Committee on High Temperatures was quoted as giving evidence that under repeated stress at high temperature the time effect becomes of importance, and that as the rate of repetition of load becomes slower the importance of the effect of creep increases, while the importance of fatigue failure by spreading cracks becomes relatively less.

Fatigue of Metals a Popular Subject

The session given over to the study of Fatigue of Metals was one of the best attended of the congress. Prof. P. Ludwik of the Technical High School of Vienna and Dr. H. J. Gough of the British National Physical Laboratory at Teddington gave general reviews of the present-day state of knowledge of fatigue, pointing out the relations between fatigue tests made under different conditions (bending, torsion, direct stress, combined stress, etc.) and pointing out the great need for a short-time test for fatigue strength.

None of the proposed short-time fatigue tests has proved altogether reliable, although the electrical-resistance tests seem worthy of further study. The existence of a definite endurance limit—a limiting stress below which, for any metal, failure will not occur even after hundreds of millions of cycles of stress—may be regarded as quite firmly established. Dr. Gough discussed fatigue tests of single crystals, and stated that as yet there is no clearly worked out theory of fatigue of metals.

D. J. McAdam, Jr., of the United States Bureau of Standards, discussed corrosion under cyclic stress, and developed a proposed form of equation for evaluating the rate of damage by corrosion and stress. Prof. E. H. Schulz of Brunswick, Germany, and Dr. H. Buchholtz of the Research Institute of the Vereinigte Stahlwerke A. G., Dortmund, gave a review of the present state of fatigue testing in Germany. Their discussion of the sensitivity of metal to notches and cracks, and the effect of the "skin" on rolled steel on fatigue strength, was of especial interest.

Tests for Rails and for Wire

Dr. P. Forcella of the Italian Royal Experimental Institute of Communications reported his experience with tests for rails to determine their fitness for service conditions on Italian railroads. He favored the use of both the alternating bending test and a repeated-impact test. He also made a separate report on a proposed alternating torsion test for the wires for cables for aerial railway and cable railway service. It seemed that his proposed test is really a form of ductility test.

In the discussion from the floor the necessity of using metals which are capable of resisting occasional overloads by development of plastic action without starting a crack was emphasized, and it was pointed out that ordinary tension tests do not give a reliable index of this kind of ductility.

Notched-Bar Impact Test Discussed

The session on the notched-bar impact test was one of the most interesting of the congress. The notched-bar test has made much more progress abroad than in America. Dr. R. H. Greaves of the Woolwich Arsenal (England) in his paper, and Dr. M. Moser of the Krupp works, both pointed out that the ability of the impact test to pick out metal which is in good condition to resist the formation of a spreading crack under occasional overstress is now widely recognized.

In their papers, and also in the papers of Prof. R. Zoja of the Royal School of Engineers at Turin, of Dr. M. Schmidt of the Gusstahlfabrik of Gebr. Böhler & Co., Kapfenberg, Austria, and of A. Steccanella of Firenze, Italy, much discussion was given to the form of impact specimens, and especially the form of notch. One limitation of the notched-bar test is that results on one size or shape of specimen cannot be evaluated in terms of results of tests using a different size or shape of specimen; hence the question of a standard specimen is of extreme importance.

A committee was appointed to consider the discussion, to make a statement concerning the degree of uniformity of opinion as to design of a standard notched-bar specimen, and to send a copy of its report to the various national standardizing bodies.

High-Power Micrographs Shown

In the session on Metallography, F. F. Lucas of the Bell Telephone Laboratories described recent metallographic equipment of high power, and showed a number of high-power micrographs of martensite, some of the pictures showing small cracks. After etching, cracks were detected with a minimum width of about 250 atoms and a minimum length of about 1000 atoms; probably the cracks were greatly enlarged by the etching process.

Prof. C. Benedicks and H. Loefquist of the Royal Technical University, Stockholm, discussed the influence of slag inclusions on iron and steel and methods for their study and detection. Dr. J. L. Haughton of the British National Physical Laboratory at Teddington discussed recent progress in metallographic technique.

Dr. W. Guertler of the Technical High School, Berlin, discussed the new concepts of alloy structure which have arisen since the study of space lattices by means of X-ray spectrograms. Prof. A. Westgren outlined the methods of using X-ray spectra as a means of identifying alloy phases of metals. The discussion was informative rather than controversial in nature.

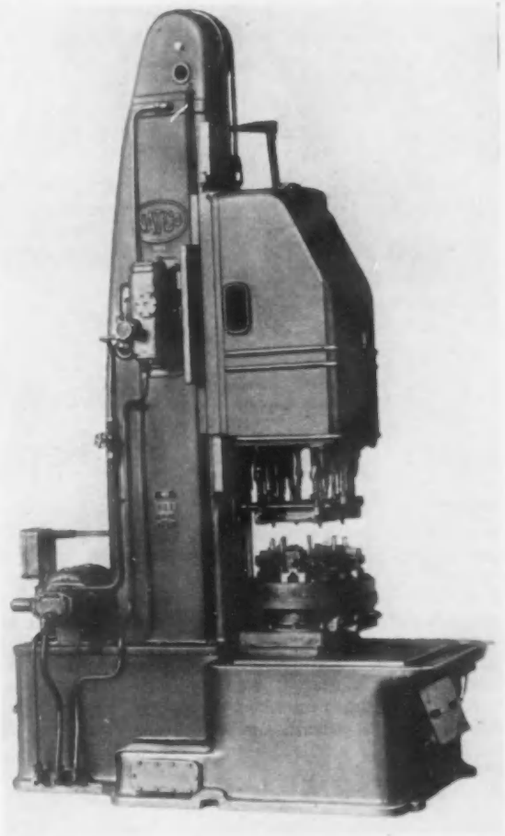
Excursions to the Amsler Testing Machine works at Schaffhausen, to the Swiss locomotive works and the Sulzer works at Winterthur, and to other points of engineering interest were enjoyed by many of the members in attendance at the congress. The Swiss Association for Testing Materials, the Canton and City of Zürich, the Federal Polytechnic School and the Swiss Federal Government all joined in making the stay of the visitors very pleasant.

Fixed Center Head Driller Has Automatic Hydraulic Feed

A VERTICAL driller with hydraulic feed, brought out by the National Automatic Tool Co., Richmond, Ind., and designed to require as small a number of parts as possible, is arranged for use with fixed center heads only. Designated as model C-12-H, it has a capacity comparable with the company's standard 6-in. horizontal drilling unit.

Either high base, as illustrated, or low base types are provided as standard. The high base has a working surface of 29 x 36 in., approximately 24 in. above the floor line. The low base, having a 32 x 36-in. working surface, 9¼ in. above the floor, is convenient when mounting high fixtures. Both bases carry the column and the hydraulic pumping unit on the rear section within which is a reservoir for the hydraulic system.

Of the usual box section, the column has a top housing carrying a double sheave wheel for the counterweight cables. The head slide moves on square ways on the face of the column. Fixed-center cluster heads are mounted in the usual manner, most of the drilling thrust being carried by the housing of the vertical drilling motor, which may be of 10-hp. or smaller capacity. The hydraulic system is supplied by a constant pressure pump driven by a 3-hp., 1200-r.p.m. motor which furnishes 200 lb. per sq. in. oil pressure, corresponding to a maximum feeding pressure of 5600 lb. For special applications, a 5-hp. motor can be used, in which case 300 lb. per sq. in. oil pressure and 8000 lb. maximum feeding pressure can be obtained. Maximum feeding rate is 15 in. a min.; rapid traverse is at 80 in. a min. The 6-in. diameter hydraulic cylinder provides 18 in. of travel, any part of which can be used for various feeding rates.



The complete operating cycle, including rapid traverse to the work, drilling at one or more feeds, rapid withdrawal of the head and stopping, is carried through automatically.

With standard equipment, the operating cycle, which is completely automatic, is started by opening a valve and continues through rapid traverse, feed, rapid upstroke and stop. In case of emergency, the valve can be closed at any point of the cycle, causing the head to return rapidly to the top of the stroke and to stop in that position. Special valve attachments are available to provide a second feed, jump feed in combination with second feed, or other special arrangements.

Both high and low bases have coolant tanks in the front section and the standard coolant pump delivers 9 gal. a min. with 4-ft. head. The machine is 136 in. high, floor space required is 48 x 83 in. It weighs about 8000 lb. without cluster heads and fixtures.

Steel Sheets with Rust-Resisting Surface

WHILE the welding of dissimilar metals is not a new art, it has remained for the Superior Steel Corpn., Pittsburgh, to develop and introduce a product in which ordinary open-hearth steel and rust-resisting metal have been combined. The company calls it a veneered steel and, using the first two letters of the company name with the word veneer, has formed its trade name, Su Veneer. Samples are on display at the National Metal Exhibit in Boston this week. Offered as a material with a surface more enduring than chromium plated steel and materially cheaper than solid stainless steel, its uses are quite as varied as either. The company has applied for patents covering the process of manufacture.

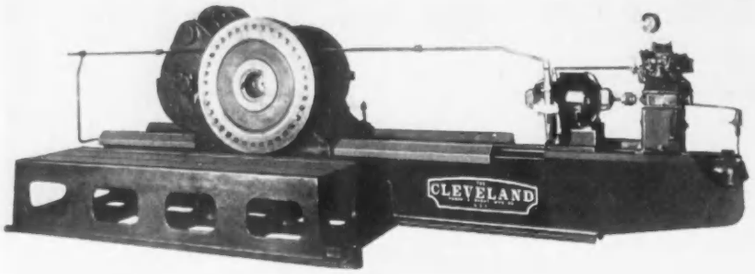
On more than 2000 etched tests, not one imperfect weld has been found and on automobile bumper stock on which a sharp bend was necessary for completely rounded ends, it was found that the bond successfully withstood the test.

The new development promises to widen and sharply increase the use of stainless or rustless steel, since this soft centered bright surfaced metal is brought within the price reach of many who have wanted a permanent bright surfaced, rust-resisting steel, but who had merely the choice of chromium-plated steel or solid stainless steel. Among uses of the new material are store front trimming, automobile lamps, washing machines, tubing and automobile running boards. In the food industry, a market for Su Veneer is believed to exist, because of its attractive price.

The maker is offering the new material running from 80 to 90 per cent open-hearth steel and 10 to 20 per cent rust resisting material on one or both sides in all widths from ½ in. to 22 in. and in thickness of 0.015 in. and heavier in coils or straight lengths in regular silky finish or very bright annealed.

Copper Used on Domes of Waldorf-Astoria

The new Waldorf-Astoria Hotel in New York, now nearing completion, has two towers sheathed with copper sheets on which aluminum foil has been applied. Rustless steel and later aluminum sheets were considered, but the aluminum coated copper was found to be considerably less expensive than other materials. About 80,000 lb. of copper sheets were used for the domes, gutters, flashings and miscellaneous metal work on the towers.



Hydraulic Rotary Planer Machines Rapidly

RAPID production and high efficiency are emphasized in the announcement of a rotary planer brought out by the Cleveland Punch & Shear Works Co., Cleveland. High speed tools are carried on the cutter head, which is mounted on anti-friction bearings. The carriage travel is hydraulically actuated, thereby providing an infinite number of feeds. Any two feeds within the range are made instantly available by setting a special selector device. This feature, it is pointed out, is particularly desirable when machining material having both thick and thin sections, such as heavy structural members.

Improvements include the design and method of lubricating the ways. All gears are inclosed in oil-tight cases, and there is rapid traverse forward and backward and automatic stops at each end. The machine is entirely self-contained and may be mounted on a circular base, if desired.

During a test the planer milled the end of a heavy structural girder at the rate of 12 in. per min.

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New Swaging Machines with Timken Bearings

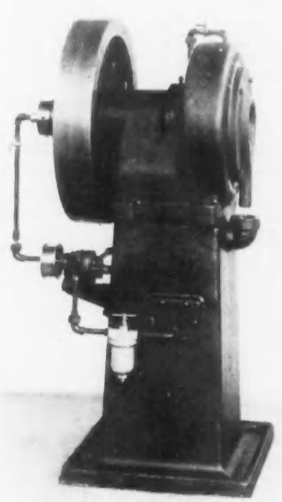
NEW swaging machines brought out by the Langelier Mfg. Co., Providence, R. I., include the use of Timken bearings for the spindle mountings. Besides decreasing friction, reducing power consumption and lengthening the life of parts, they were provided to secure close concentricity between the revolving spindle and the head or retainer rolls as well as permitting a shorter and more rugged spindle.

Eleven sizes are offered, ranging in maximum tube capacity from 3/16 to 9-in. diameter. The smaller sizes, with capacities of 3/16, ⅜, ¾, 1⅛ and 1½ in., have standard die lengths of 1, 2, 3 and 4 in. The three larger swagers, having maximum tube capacities of 5, 7 and 9 in. and die lengths furnished to suit operating conditions, are obtainable either with Timken or plain spindle bearings. The plain bearing type has bronze bushings in the head with the flywheel mounted between these and an outboard bearing.

All machines are now mounted on cabinet type bases with integral oil reservoir and a lubricant pump, belt driven from the spindle. Oil is drawn through a filter and forced through two leads, one extending to the top of the head, the other being attached to a gland at the rear of the hollow machine spindle. After cooling and lubricating the working parts, the oil returns by gravity to the reservoir.

Water jackets in the head furnish additional cooling for hot swaging. These are standard on all swagers with the exception of the "A" type, which is designed especially for pin pointing and is furnished for bench mounting only. The type "A" swager is not equipped with an oil pump, but is provided with a sight-feed oiler at the top. Other models, designated as types "B" and "C," are furnished with cages or retainer rings for the head rolls, but can be arranged with fixed head ring if desired.

Work holding and feeding mechanisms, obtainable for attachment to any of the new swagers, include the following types: handwheel operated, single or compound geared, rack and pinion feed, hand or pneumatic clamping; hydraulically operated (for large machines), mounted on cast iron holder base or guide rods, with hand clamping or pneumatically operated gripping jaws.



Special alloy steels are used for dies and other working parts of the swaging machines.

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Self-Protected Precision Ball Bearings

SELF-PROTECTED closed-type ball bearings, designated as the 7000 series, are being placed on the market by the Norma-Hoffman Bearings Corpn., Stamford, Conn. Of the all-steel, lubricant-packed, dirt-and-moisture-proof type, they embody improvements designed to simplify mounting and lubrication, and to reduce the cost of machining and assembling.

Wide, solid inner and outer rings give maximum contact on shaft and in housing; and the new bearing can be clamped on both sides. It will carry thrust loads in either direction in combination with the radial load. The "Greaseal" feature consists of a substantial felt washer and a thin fiber ring interposed between split snap rings securely held in a groove in the outer ring. The inner ring is recessed to present a shoulder which, with the felt washer, forms an effective labyrinth as an added safeguard against escape of lubricant. There is ample space for grease, thus reducing the attention needed for proper lubrication. A full range of sizes is made; this bearing interchanges in overall dimensions with all other makes of self-protected bearings.

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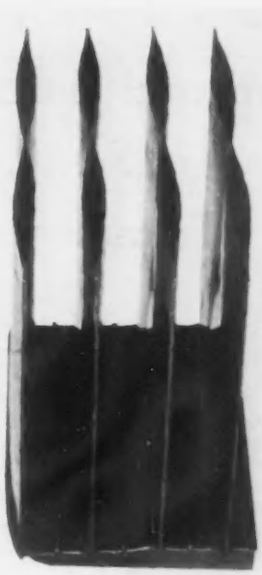
Output of galvanized pails and tubs in July rose to 103,345 doz. from 92,460 doz., in June, while shipments increased to 114,134 doz., valued at $289,987 from 90,747 doz., valued at $238,987, according to reports received by the Bureau of the Census from 13 establishments comprising a large proportion of the industry. Production of other galvanized sheet-metal ware made a slight gain to 27,970 doz. from 26,304 doz., and shipments decreased to 27,334 doz., valued at $160,503, from 28,724 doz., valued at $171,265.

Making Radiators of Flat Steel Sheets

TWO long strips of 1/20-in. steel, welded together around the edges and then blown up by air pressure, are used by the Westinghouse Electric & Mfg. Co., East Pittsburgh, in making transformer radiators. In the manufacture, two flat steel sheets cut to the right shape are placed back to back, welded air-tight around the rim and then spot-welded down the center for strength before being deformed in any way. Automatic resistance seam welders do this work.

This flat, air-tight metal bag is then placed between the retaining walls of a jig, and air pressure, 90 lb. a sq. in., inflates the steel shell to produce a light, rugged, cooling section. After welding, inflating and forming, several cooling sections are grouped into a common header to form the radiator.

Great care is taken that the welds do not leak. The inflating air is a severe test itself, but the most trying ordeal follows the complete assembly, when the radiator is stood upright and oil at 80 deg. C. at pressure of 15 lb. a sq. in. is circulated through it for 2 hr. All welded surfaces are on the outside, where they can easily be inspected. Parts are quickly cleaned and painted and there are no places on which water can stand.



Transformer radiator made of blown-up sections constructed of steel sheets. Detail at right shows how the parts are mounted and the extent of "blow-up."

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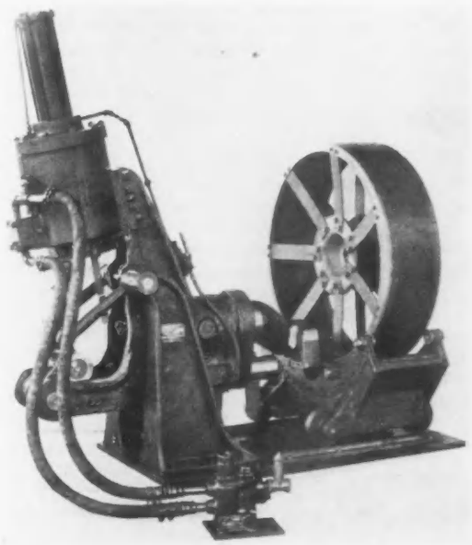
Riveters for Fabricating Farm Machine Wheels

TWO single-purpose riveters, developed by the Hanna Engineering Works, 1765 Elston Avenue, Chicago, for fabricating wheels of agricultural implements are shown in the accompanying illustrations. The first machine is designed to rivet the spokes to the rim. Duplex dies are provided for driving two ⅜-in. cold rivets simultaneously under 50 tons pressure. As illustrated, the wheel is carried on a truck provided with nest rollers for rotating the work. These rollers, as well as the small wheels on which the work-holding truck is mounted, are ball-bearing equipped.

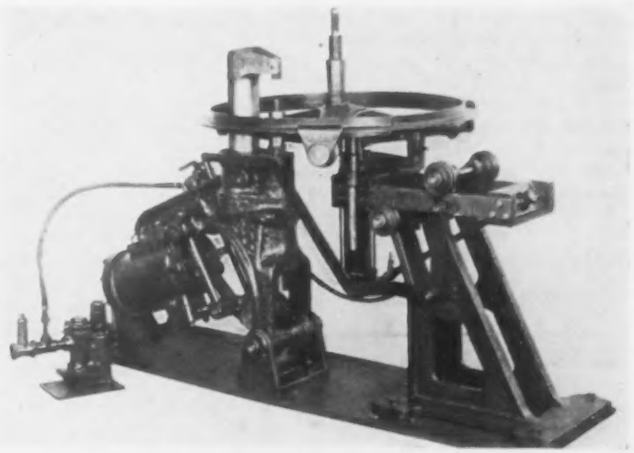
Vertical movement of the riveting jaw is accomplished by a pneumatic jack which swings the entire mechanism on its trunnion mounting. This jack is controlled by a convenient poppet valve; the riveting dies are controlled by a foot valve on the floor.

The second machine is for riveting the spokes of the wheels to the hub. An air jack is provided for raising and lowering the work-holding carriage to insert the riveting dies between successive pairs of spokes. Other operating features are indicated below.

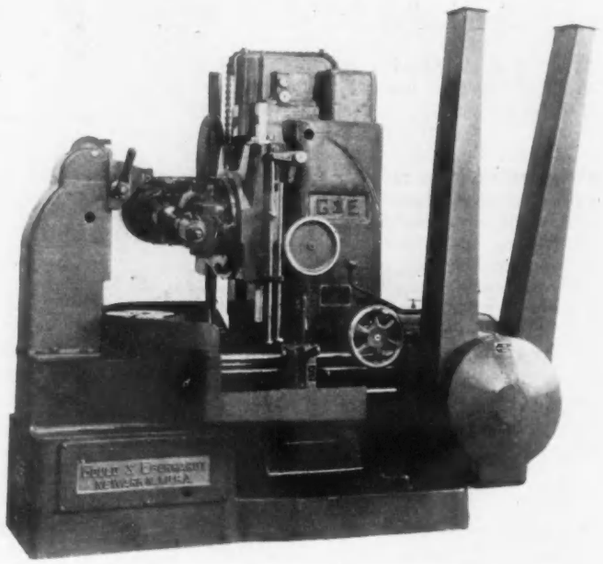
The rivet driving mechanism is of the same toggle and lever type used on the company's other riveting machines. It combines a long die stroke with a wide range of uniform pressure. The die approaches the work rapidly, the speed decreasing gradually until it enters the uniform pressure portion of the stroke. Thus, as the rivet head is formed, the pressure increases, the maximum pressure being maintained for several inches of piston travel. Ordinary variations in rivet lengths and plate thicknesses are automatically taken care of by the wide range of uniform pressure.



TWO rivets, attaching spokes to rim, are headed simultaneously by the machine at left. The equipment shown below rivets spokes to hub.



Universal Hobbers for Gears of Synchro-Mesh Transmissions



THE machine is rated for steel gears of 4 D.P.; a lighter model is made also.

DEVELOPED especially for the production of single, helical and built-up herringbone gears used in silent and synchro-mesh transmissions, but equally suitable for machining other fine pitch and small diameter gears, two new universal gear-hobbing machines, designated as types 12-H and 12-H Heavy, have been placed on the market by Gould & Eberhardt, Newark (Irvington), N. J.

The 12-H manufacturing hobber will cut gears up to 12-in. diameter, or up to 18-in. diameter with the support removed. It is rated for 5 pitch in steel and weighs 4600 lb. The larger machine, here illustrated, has the same capacity for gear diameters but is rated for 4 pitch in steel and weighs 6600 lb. Major features of construction are the same as in the smaller unit.

Both machines employ the vertical cutting principle and have the cutter slide mounted on an adjustable stanchion and the work spindle in fixed bearings in the base of the machine. The hob slide travels on double rectangular guides provided with independent adjustments. A 180-deg. angular adjustment of the swivel cutterhead permits hobbing of both right and left-hand helical gears of any angle. Full length of hobs may be utilized, a positioning device permitting the hobs to be shifted axially to additional cutting positions without removing them.

Power rapid-traverse and feed controls are interlocked; the former can be operated when the work and cutter spindle are idle or rotating. Adjustable stops govern the movement of feed and traverse, and fixed safety stops control the extreme limits of action. Accidental downward operation of the power traverse is prevented by a safety pin in connection with an adjustable cam to stop rapid approach. Each phase of the cutter movement cycle—rapid approach, feed and rapid traverse—is automatically arrested at a predetermined point.

The work table is mounted in a bearing fixed in position within the base casting. A large tapered bearing is employed on the heavy machine; the work table of the lighter hobber is mounted in Timken bearings. The box-type work arbor support has an arm that can be adjusted and locked in any position by means of a single lever. Adjustment of the cutter spindle fits is possible without disturbing the machine setting.

Pressure lubrication is provided; a separate pump supplies coolant to the hob. Drive is through belt or silent chain to a constant-speed driving pulley mounted on anti-friction bearings. There is a plate-type clutch and, in the power traverse drive, a safety friction-slip gear. Automatic in-feed mechanism for hobbing worm wheels by the in-feed method is obtainable.

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Portable Drill, Reamer and Nut Driver

HIGH torque and absence of vibration are advantages claimed for the portable drill, reamer and nut driver shown in the accompanying illustration. This tool has been added to the Hercules line made by the Buckeye Portable Tool Co., Dayton, Ohio. Although intended for structural steel, shipbuilding and other heavy work, it weighs only 40 lb. Models are made having speeds of 120 and 68 r.p.m. A spade handle or breast plate can be used in place of the ratchet wrench for controlling the feed. The drill is equipped with a No. 5 Morse taper shank; the nut driver with a ⅞-in. square spindle.

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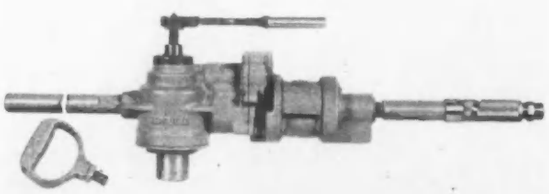
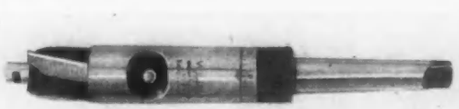
Adjustable-Length Quick-Change Tool Holder

ADJUSTABLE-LENGTH quick-change tool holders are being made by the Wilder Tool Co., Greenfield, Mass., for multiple-spindle operation of counterboring, core drilling, countersinking, hollow milling and combination multi-diameter, one-operation tools. These tools are interchangeable in a holder of a given size, including the company's standard line of quick-change holders and chucks.

The holders are made of alloy steel, hardened and ground to size and alinement. Tools can be guided from the outside diameter through guide bushings or from the end, by hardened and ground removable pilots. Length adjustment ranges from 1¾ to 2 1/32 in., depending upon length of holder required; it is made direct in 0.001 in. by turning graduated barrel.



(At Left) New Hercules drill, reamer and nut driver. (Below) Length adjustment of the tool holder is indicated directly to nearest 0.001 in.



OFF THE ASSEMBLY LINE

Outlook for Automobile Industry Uncertain as Sales Dwindle

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DETROIT, Sept. 21.

UNCERTAINTY is the best word with which to characterize the present automotive situation. Retail sales have dropped sharply, the buying power of the public seems to be partially paralyzed and manufacturing executives scarcely know what to do next to stimulate business. Almost all barometers formerly relied on to give a clue to the future trend have proved of little value under present conditions. Although October is close at hand, some automobile makers have not decided when they will bring out new models or what mechanical features will be incorporated in them.

It has been the practice in the past year to attempt to emerge from a dull period by turning to the production of new models. Late in 1930 Chevrolet broke away from its traditional policy by announcing a new car more than a month ahead of the usual time and thereby got a running start into 1931, the momentum of which has carried it through the year with a remarkable record. Hudson did the same thing as Chevrolet, with less success. Plymouth has perhaps the most amazing performance to its credit by putting on the market its "floating power" car in mid-summer and selling it in sizable volume, considering the slowness which generally prevails in retail circles during July and August.

Under the circumstances one might expect the industry to adhere to this practice to extricate itself from an unhappy situation, but there apparently has been a change in sentiment among leading executives. They are of the opinion that, with the year far gone, winter near at hand, everyone holding tightly his purse strings and little indication of a revival of industrial activity in the near future, it would be fruitless to rush new models on the market as an artificial stimulus to business. Sales prior to the end of the year would not be large and companies would go into 1932 with models that would be branded as old by the motoring public.

September automobile production still expected to be less than that of August, with October bringing a further reduction in assemblies.

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Motor car makers are holding off new models until December or automobile shows in January, feeling that earlier presentation will not materially stimulate retail demand.

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Further simplification of transmission and streamline effect for body expected to be main changes in design of 1932 cars.

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Automobile plants are asking for protection at present prices on parts and castings through first half of next year. Chrysler and local Chevrolet plants have placed their fourth quarter steel contracts.

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Delays Seen in Introduction of New Car Models

It is not surprising, therefore, that some companies have decided to withhold their new cars until December or the January automobile shows. Meanwhile, other builders are in a quandary as to the best method to pursue. With current demand at low ebb, one of the questions to be solved is how many cars to produce of the present series. The uncertainty existing is best illustrated by the case of a prominent manufacturer. Early the past week orders were issued stating that the entire plant would be down from Sept. 30 to Nov. 6. The next day the order was countermanded and instructions given to keep certain departments operating without interruption. On the third day still another order went out from headquarters declaring that the assembly departments would run one day a week indefinitely.

This tendency to delay rather than hasten the advent of 1932 cars promises little for the steel trade for another 30 days. A few makers will get into production some time next month, but it is believed that the industry will not be in full swing until Nov. 1. Even then, the steel people in close touch with the automobile industry find slight hope of demand for steel being sustained beyond the time when dealers are stocked. To justify this opinion they point to retail sales performance in previous years, when the early months of the year yielded only a comparatively small amount of business.

Many Changes in Design Are to Be Made

Extensive changes in body and mechanical design are being prepared by most manufacturers. It is anticipated that improvements will center on further simplification of the transmission and streamline effect for the body. Amos Northrup, chief designer of the Murray Corpn. of America, said recently that "it seems now that something on the order of a definite style has appeared—aerodynamics. Automobiles of 1932 will be very much affected by it; if not scientifically, they will be in appearance. It is along these lines that many of the fenders and other parts of the chassis and bodies of 1932 will be improved, and the popularity of the V radiator will increase, cleaner rear ends will be designed and built that will eliminate a great deal of dirt gathering and greatly improve their looks."

Mr. Northrup designed the Reo

Royale, which has set the pace in streamlining effects. Along this line it is reported that Buick is contemplating a somewhat radical departure in body design, abandoning the conservative lines of its present car for the sweeping effects of a streamlined body with V-type radiator. Another manufacturer, smaller than Buick, which has been watching the reception of the Reo Royale, is said to be ready to adopt many of the features embodied in that car.

Details of New Ford Car Not Yet Completed

So far as the Ford Motor Co. is concerned, its status has changed little in the past week. It still is working on the present model A, with all the details of the new car not yet completed. Like other makers, Ford seems in no hurry to begin production of the new series. No steel releases, other than small amounts for experimental purposes, are in sight until some time in October. Ford recently had a stock of 100,000 tons of steel billets at Rouge, but it is understood that this has been reduced by the shipment of 40,000 tons to Soviet Russia, leaving about two months' supply on hand for the Ford rolling mills. Ford's steel mills still are idle, with no news available regarding the date of their resumption. The Murray Body Corpn. recently was awarded a large contract for frames for the new Ford car and is now rushing to completion an addition to its Ecorse, Mich., plant, where the frames will be made. This plant is adjacent to the steel mills of the Great Lakes Steel Corpn. Ford is now reported to have definitely decided to use a chromium-plated steel radiator shell instead of rustless steel.

Chevrolet Shuts Down Foundry

Chevrolet's annual shutdown for change-over to new models has started with the closing of the gray iron foundry at Saginaw. This unit probably will be idle until the middle of October. The gear and axle and forge plants in Detroit are likely to continue operating until the end of this month, when they likewise will begin tooling up for next year's production. Plymouth is turning out about 18,000 jobs in September, with curtailment scheduled for October. Output at Dodge is unusually light and is likely to remain at a low level for at least 30 to 40 days. Other plants, with few exceptions, are poorly engaged.

Chrysler and the local Chevrolet plants have placed their fourth quarter steel contracts. In several cases automobile companies are asking for protection on steel requirements at present prices through the first quarter of 1932, but it is believed that they are not likely to meet with much success on this point. One large motor car maker has placed orders for parts at current prices until July of next year and likewise is asking for quotations on castings for the first quarter, with the option of renewing the contract without price change for the second quarter. Motor car companies are represented as being more interested in making sure that they are getting as low prices for steel and other materials as their competitors than being motivated by the desire to hammer down the market.

There is additional evidence that in the present tight situation certain automobile companies are attempting to pass the burden of carrying inventories to their sources of supply. For example, a low-priced maker recently sent releases for a considerable number of castings to a foundry outside of Detroit, but failed to enclose shipping instructions. Investigation revealed that the company apparently wanted the castings made and stocked so that they could get them on short notice. The foundry thereupon refused to tie up large sums of money in inventory. This is by no means an extraordinary case. There is a considerable number of parts companies still holding in stock materials for which orders were placed in 1930.

Tendency Toward Stronger Brakes

With the coming of free wheeling has arisen the problem of better and stronger brakes. There has been much agitation, also experimentation, the last two months about the substitution of cast iron for steel in making brake drums. Here was the possibility of a loss of a substantial tonnage of steel by the steel mills. It is reported that this matter may be settled satisfactorily by having the braking surface made of iron and the remainder of steel. If this is done, the tonnage of steel affected will be slight.

Employment in Detroit has changed little in the last two months. The number of workers unemployed just now stands at less than 100,000. Men in seasonal occupations who are faced with the loss of their jobs in the near future are likely to be offset by the increased men needed by automobile factories in turning out new models. Under the circumstances the employment situation is expected to remain virtually unchanged until at least the end of the year. What officials fear is an influx of former Detroiters as the motor car industry picks up and of a considerable number of "floaters" who will throw themselves on the mercy of the city for the duration of the winter.

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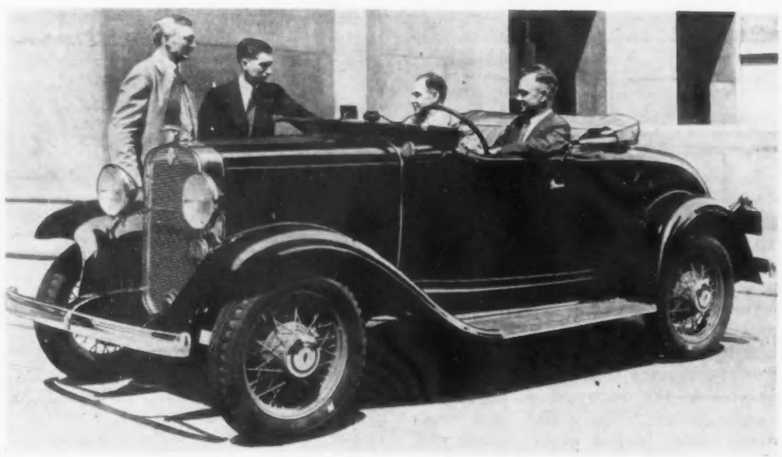
Steel Wheel Production Shows Increase

More than 90 per cent of all motor car production for the first six months of this year was on steel wheels, according to the Budd Wheel Co., Philadelphia and Detroit. This figure represents an increase over the first quarter of the year, when steel wheels accounted for 87 per cent, the Budd statement says.

This increase in the proportion of metal automobile wheels is attributed to increased popular demand for wire wheels, combined with improvements in design and development of manufacturing economies which have made it possible for the factories to equip their cars with wire wheels at no extra cost.



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Chevrolet's 8,000,000th Car

THE Chevrolet Motor Co., whose production record this year has been outstanding, recently turned off the assembly line the 8,000,000th car since the name Chevrolet was first attached to an automobile. To celebrate the occasion, some of the officials of the company had their picture taken with the car. At the left is W. S. Knudsen, president and general manager, and next to him is H. J. Klinger, vice-president and general sales manager, while seated at the wheel of the car is C. E. Wetherald, general manufacturing manager, and his companion in the seat is J. M. Crawford, chief engineer.

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Higher Taxes Are Believed to Be Inevitable

Reed and Bacharach Proposals, Together with Treasury Department Program, Focus on Problem

WASHINGTON, Sept. 22.—While the Hoover administration continues to maintain silence on the subject, the feeling grows that there will be tax increases at the forthcoming session of Congress. Economic conditions appear to make them probable. The Treasury already faces a deficit of something like $1,000,000,000. Moreover, the tendency is for it to increase rather than to decrease. Authorities apparently are resigned to the fact that there will be no business upturn sufficient to yield tax returns that will make up anything like the loss and possibly not even meet expenditures.

The question becomes more and more one of the direction new taxes will take and less and less one of whether there will be additional taxes. It is an issue that cannot be determined at this time. Nevertheless there is focusing of views that seem to be gathering force.

It is perhaps the dominant opinion that large income rates and those falling in the middle class, $10,000 to $25,000, will be raised to apply on 1932 incomes. Gift, inheritance and estate taxes also appear to be popular sources at which higher taxes may be directed. This is partially the program proposed by Representative Bacharach, Republican, of New Jersey, and prominent member of the House Committee on Ways and Means, which is responsible for originating revenue legislation. Largely, though not entirely, it is a proposal to assess higher taxes on wealth. Mr. Bacharach also has proposed a sales tax on "luxuries and non-essentials," but reaction to this plan probably depends on the exact character of commodities he includes in the term.

Opposition to Sales Tax

A general sales tax, proposed by Senator Reed, Republican, of Pennsylvania, and prominent member of the Senate Committee on Finance, which also has charge of revenue legislation, has met with vigorous opposition. The prevailing opinion is that it cannot be adopted, unless narrowed to include only certain commodities. It has much opposition both within and without Congress, especially from so-called independents of both parties. It is also opposed by important industries, particularly the automobile industry, as well as by its wholesale and retail units. The American Federation of Labor has strongly assailed the proposed tax. The proposal of Senator Reed is for a tax of one-half of 1 per cent on every retail sale, affecting every household in the country. The Reed proposal to abolish the capital gains and loss provision of the tax laws, however, seems to meet with considerable approval.

The Treasury Department is reported to have prepared a tentative tax program that differs from both the Bacharach and Reed plans. The Treasury Department is said to be in favor of broadening the application of the income tax. This belief is based on an address made last May by Secretary Mellon in which he pointed out the individual income tax has become so restricted in its application that it has become a class rather than a general tax, with its incidence limited to a comparatively small number of taxpayers. He declared that out of a total population of 120,000,000 only 2,500,000 individuals and about a quarter of a million corporations pay an income tax. Furthermore, he said, some 380,000 individuals pay about 97 per cent of the total amount received from individual income taxes. He also commented on the fact that both normal rates and surtaxes have been reduced, the war and excess profits taxes on corporations have been removed, the estate tax lowered and excise taxes on sales prices of many articles eliminated.

He did not say what readjustments he favored, but since there can be no war and excess profits tax on corporations, it is assumed he may have had in mind at least partial restoration of higher estate taxes and excise taxes on sales, a proposal that has aroused much opposition.

Both Senator Reed and Representative Bacharach are conservatives and close to the administration, and while their tax programs are widely divergent, it is the view that they may receive a great deal of consideration by the administration and that parts of each, together with proposals of the Treasury Department, may be combined and offered as the legislative program. The next Congress will be closely divided between Democrats and Republicans, many of them being so-called Progressives, and will undoubtedly see much wrangling over taxation and many other questions, heightened greatly by the Presidential campaign and unrest growing out of the depression. It is therefore altogether hazardous to predict what it may do with regard to taxation. There undoubtedly will be much so-called liberal sentiment for "soaking the rich," though the veto power of the President is expected to be enough to forestall the trends.

Community chest drives have a bearing on taxes. Contributions will have to be unusually heavy, if the Treasury is to escape additional burdens on top of its existing large deficit. Another important factor affecting the Government's finances is the growing tendency toward paring down war debts and revising reparations.

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Industrial Planning Is Defined by J. W. Hook

Industry needs a plan, according to James W. Hook, president, Geometric Tool Co., New Haven, Conn., and chairman of the New England Council's industrial committee. In addressing the New England Council he defined his position on planning as follows:

"I most certainly do not mean a Soviet Russia type of planning, conceived by a central autocratic planning commission and forced upon industry by an all-powerful dictator. I mean, rather, a type of planning that stirs individual management to its highest efforts and that enables that management to check its action and policies with successful methods used and proved elsewhere to have been possible and effective.

"I mean a kind of planning that will squarely face the evils of unbridled competition, destructive governmental restraint, absentee ownership and security-jobbing financial profiteering.

"We need a plan that will help us to answer why more than one-half of the corporations making tax returns for the year 1929 showed no net income, and we need a plan to help us evaluate what the effect upon our nation will be if the present tendency to gather individual industries under the control and management of a central source continues."

Referring to the war debt problem in his address, Mr. Hook recommended that the New England council make a study preparatory to taking a position on that moot question.

"Nothing would do more to remove the capitalistic world from the shackles of depression than the wiping of 40 or 50 billion dollars of international debts off the balance sheet of the world," he said.

"What thinking man of today believes that these debts will ever be paid?" he asked. "The United States already has in its vaults practically half of the gold of the world. She will not accept payment in kind. The drastic drop in commodity prices has increased the debts enormously—so much so, in fact, that they are much greater today than when the war ended. Make no mistake about it, when the moratorium ends next June our country will have to make a very definite decision on the whole war debt problem."

Steel Corporation Reduces Wages 10 Per Cent; Bethlehem Immediately Follows

Other Companies Likely to Put Corresponding Cuts Into Effect—About 220,000 Employees of Leading Producer to Be Affected

ON Tuesday afternoon the United States Steel Corpn. announced a 10 per cent cut in wage rates. The statement was as follows:

"For the purpose of better meeting prevailing unsatisfactory conditions in the industry, rates of wages in the plants of the subsidiary companies of the United States Steel Corpn. will, effective Oct. 1, be reduced by approximately 10 per cent, varying somewhat in the character of work performed. Such adjustment will be somewhat in line with the reductions recently made in the salaried rates."

About 220,000 wage earners are affected by the reduction, but in view of the wide variation in working time under present conditions of slack operations and rotation of employment, it is stated that no satisfactory estimate can be made of the saving that will accrue from the cut. Various unofficial estimates have placed the saving at all the way from 60c. to $2 a ton.

Bethlehem Also Takes Action

The Steel Corporation's action on wage rates has already been followed by the Bethlehem Steel Corpn. and other steel companies are expected to make similar moves within a few days.

Eugene G. Grace, president of the Bethlehem Steel Corpn., in making the wage announcement for his company, said that he considered the action of the Steel Corporation in readjusting wages downward to be a constructive move. Bethlehem's cut will also take effect Oct. 1.

Independent steel companies other than Bethlehem, up to a late hour on Tuesday, had taken no action. As a matter of fact, many of them did not hear of the Steel Corporation announcement until very shortly before closing time Tuesday. Although such action on the part of the leading steel producer has been expected by many in the trade, it was thought that no formal announcement would be made earlier than next week.

Under the circumstances, there had been no time up to the hour when various steel companies were interviewed by THE IRON AGE by telephone for them to consider formal action, but it was stated that in all probability all of the independent companies would follow the Steel Corporation's example.

The Youngstown Sheet & Tube Co. is understood to have already taken preliminary steps toward a wage cut announcement. The Republic Steel Corpn. stated that a meeting of the executive committee would be held as soon as possible to take action. The National Steel Corpn., through E. T. Weir, chairman, said that the wage situation will be considered at once, and that a similar reduction in the mills of that company was likely. The Jones & Laughlin Steel Corpn. would make no statement, nor would the Pittsburgh Steel Co. and some other producers in the Pittsburgh district.

At Cleveland, E. J. Kulas, president, Otis Steel Co., said that the Steel Corporation had acted wisely, and that his own company would "think it over." The Corrigan-McKinney Steel Co. stated that it would in all probability "follow suit." The Inland Steel Co. said that it had as yet taken no action on wages, but that the company's policy is likely to be in harmony with the Steel Corporation's action.

Some companies did not wish to be quoted, but said that in their opinion the entire steel industry would settle upon the new wage basis within a short time.

Reduction Comes as Last Resort

Wage readjustment by the Steel Corporation comes as a last resort. Through the past two years of slack demand that company has consistently pursued a policy of alternating work among as many employees as possible and has upheld wage rates. For the period from Oct. 1, 1930, to Aug. 31, 1931, the average number of its regular forces given employment was in excess of 94 per cent. This average will be somewhat less for the year 1931, but wage earners who will be affected by the reduction number about 220,000.

The Steel Corporation has made 22 wage adjustments in the past 30 years. During that period it has reduced wages on only four occasions and has voluntarily raised wage rates 18 times.

So far as can be learned, there will be no deviation from the Corporation's policy of rotating work to give maximum employment.

Record of Wage Changes

Previous wage announcements of the Steel Corporation dating back to 1915, have been as follows:

Jan. 6, 1916, 10 per cent increase.
May 1, 1916, 10 per cent increase.
Dec. 15, 1916, 10 per cent increase.
May 1, 1917, 10 per cent increase.
Oct. 1, 1917, 10 per cent increase.
April 15, 1918, 10 per cent increase.
Aug. 1, 1918, 10 per cent increase.
Oct. 1, 1918, 8-hr. basic day adopted.
Feb. 1, 1920, 10 per cent increase.
May 16, 1921, 20 per cent increase.
June 6, 1921, basic 8-hr. day abolished.
Aug. 29, 1921, decrease to 30c. per hr.
Sept. 1, 1922, 20 per cent increase.
April 16, 1923, 11 per cent increase.

The following table shows the wages of common labor after each advance or decrease in wages by the United States Steel Corpn.:

Date	Wages 10-Hr.
1915	$2.00
Feb. 1, 1916	2.20
May 1, 1916	2.50
Dec. 15, 1916	2.75
May 1, 1917	3.00
Oct. 1, 1917	3.30
April 15, 1918	3.80
Aug. 1, 1918	4.20
Oct. 1, 1918	*4.62
Feb. 1, 1920	5.08
May 16, 1921	†4.05
July 16, 1921	†3.70
Aug. 29, 1921	3.00
Sept. 1, 1922	3.60
April 16, 1923	††4.00

*8-hr. basic day established and time and one-half paid for overtime.
†Approximated.
††$4.00 for 8-hr. workers; $4.40 for 10-hr. workers.

Employees and Wages

The number of employees of the Steel Corporation from 1916 to 1923, inclusive, and in 1930, according to the annual reports, has been as follows:

1916	252,668	1921	191,700
1917	268,058	1922	214,931
1918	268,710	1923	260,786
1919	252,106	1930	211,055
1920	267,345		

The average salary or wage per employee per day of all employees, exclusive of general administrative and selling force, has been: 1912, $2.68; 1913, $2.85; 1914, $2.88; 1915, $2.92; 1916, $3.29; 1917, $4.10; 1918, $5.33; 1919, $6.12; 1920, $6.96; 1921, $5.61; 1922, $4.78; 1923, $5.73; 1924, $5.74; 1925, $5.77; 1926, $5.82; 1927, $5.86; 1928, $5.85; 1929, $5.84; 1930, $5.80.

The average compensation, including general administrative and selling force, has been: 1912, $2.75; 1913, $2.92; 1914, $2.97; 1915, $3.01; 1916, $3.36; 1917, $4.16; 1918, $6.12; 1919, $6.17; 1920, $7; 1921, $5.73; 1922, $4.91; 1923, $5.83; 1924, $5.85; 1925, $5.88; 1926, $5.94; 1927, $5.99; 1928, $6; 1929, $5.99; 1930, $5.99.

... PERSONALS ...

C. W. BENNETT, vice-president of the American Sheet & Tin Plate Co., Pittsburgh, effective Sept. 15, assumed direction of plant operations heretofore in charge of W. A. IRVIN, who was recently appointed vice-president of the United States Steel Corpn., with headquarters in New York. G. C. KIMBALL, assistant to vice-president and chief engineer of the Sheet & Tin Plate company, has been elected vice-president in charge of plant construction, improvements, patents and similar matters. H. G. MCILVRIED, who has been assistant chief engineer, succeeds Mr. Kimball as chief engineer of the company. Mr. Bennett is a native of Wisconsin, and was graduated from the University of Wisconsin in 1892. He entered the steel industry in 1894 as mechanical engineer with the Illinois Steel Co. at Joliet, Ill. Three years later he went to the Elwood, Ind., works of the American Tin Plate Co., where he remained for nine years, part of which time he served as manager of the company's Indiana mills. He was transferred to Pittsburgh in 1906, and appointed assistant to the president, a position he held until November, 1925, when he was elected vice-president. Mr. Kimball was graduated from Harvard University in 1900, and entered the steel industry in 1901 in the engineering department of the American Tin Plate Co. at Pittsburgh. He was appointed chief engineer of the American Sheet & Tin Plate Co. in 1905, and has held that position continuously until his recent promotion.

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F. D. HOOPER, formerly sales manager of the Lidgerwood Mfg. Co., Elizabeth, N. J., and identified with that company for 24 years, has been appointed general sales manager of the Barber-Greene Co., Aurora, Ill., maker of materials-handling equipment. He received his mechanical and electrical engineering degrees from Cornell University in 1907 and was employed for a short time after graduation with the Lackawanna Steel Co. and with the Boston & Maine Railroad.

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LAWRENCE CARR STEELE, formerly consulting and experimental engineer with several sheet and tin plate plants, has become affiliated with the Aetna-Standard Engineering Co., Youngstown, as consulting engineer on sheet and tin plate equipment. He has been identified with the sheet and tin plate industry for more than 30 years, his first connection having been with the old American Tin Plate Co. In 1903 he was made district engineer of the Wheeling plants of the American Sheet & Tin Plate Co. and later was placed in charge of the company's plants in the Vandergrift district. Seven years later he entered the employ of the Jones & Laughlin Steel Corpn., in charge of the installation of its tin plate plant at Aliquippa. From 1922 to 1926 Mr. Steele was connected with the Bethlehem Steel Co. at Sparrows Point, Md. During all this time Mr. Steele invented numerous devices used in the making of sheets and tin plate and is credited with more than 200 such patents.

A. B. ELY, formerly chief engineer of the Bassick Co., maker of casters and metal furniture trimmings, Bridgeport, Conn., has been made production manager of M. H. Rhodes, Inc., Hartford, Conn., manufacturer of switches.

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GLENN R. LAPAGE, general sales manager, Yates-American Machine Co., Beloit, Wis., manufacturer of wood-working machinery, sailed Sept. 16 for Europe to devote six weeks to furthering the foreign sales campaign undertaken by the company following the development of numerous new features in its line of tools.

C. W. BENNETT F. D. HOOPER L. C. STEELE

W. S. KNUDSEN, president and general manager of the Chevrolet Motor Co., sailed Sept. 23 for a five weeks' sojourn in Europe.

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WILLIAM J. JOHNSON, who has been in charge of sales in the Pittsburgh district for the National-Erie Co., Erie, Pa., has been elected president of the company following a reorganization in personnel. He succeeds A. HUNTER WILLIS. B. L. WEAVER continues as vice-president and treasurer, with headquarters in New York, while HENRY E. SCOTT has been reelected secretary and assistant treasurer, with headquarters at Erie.

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F. G. BROWN, who has been identified with Republic Steel Corpn., Youngstown, and concerned with the sale of tin plate and kindred products, has resigned and has become associated with the Weirton Steel Co., Weirton, W. Va., as special sales agent. Mr. Brown was identified with the old Trumbull Steel Co., Warren, Ohio, prior to its absorption by the Republic Iron & Steel Co. in 1928.

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E. J. SLOAN, for many years a director, has been made first vice-president of the Cushman Chuck Co., Hartford, Conn.

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TOROLF KROGVIG, who has been appointed director of the Technical Institute of Norway, at Oslo, to cover iron and non-ferrous foundry work, is spending a few weeks in the United States to acquaint himself with foundry methods and equipment and instruction in the technical schools. His headquarters in this country is at 2877 Fernwalk Road, Squirrel Hill, Pittsburgh in care of Ruud Larsen.

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DR. H. FOSTER BAIN, secretary, American Institute of Mining and Metallurgical Engineers, has resigned, effective Nov. 1, and will go with the Copper and Brass Research Association, New York. He will be succeeded by A. B. PARSONS, assistant secretary of the institute.

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T. S. QUINN, treasurer of the Lebanon Steel Foundry, Lebanon, Pa., returned recently from a two months' trip to Europe.

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WALTER E. CHOLLAR has been appointed assistant to the president of the Remington Arms Co., Bridgeport, Conn. For a number of years Mr. Chollar was local purchasing agent at

the Ilion, N. Y., plant and for the past five years has been general purchasing agent for all branches. Recently he was made vice-president and general manager of the Remington Cash Register Co. HUGH G. SIVELL, who has been assistant general purchasing agent, has been made general purchasing agent.

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C. W. MAYER, for many years manager of the Indianapolis, Ind., office of the Crucible Steel Co. of America, New York, has retired but will continue to act in a consultative capacity. ROY SLAUGHTER has been appointed manager.

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LEWIS E. PORTER, vice-president of the S. F. Bowser & Co., Inc., Fort Wayne, Ind., has been transferred to the vice-presidency and managership of the S. F. Bowser & Co., Ltd., Toronto. No successor to Mr. Porter will be named. T. D. KINGSLEY, vice-president in charge of Eastern sales of the company, with headquarters in New York, has resigned.

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LEON J. CONE has been appointed district manager at Duluth for the Sullivan Machinery Co., Chicago. He succeeds JONATHAN A. NOYES, who has been made manager of the company's coal machinery sales division, with headquarters in Chicago.

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CARL A. JOHNSON, president, Gisholt Machine Co., Madison, Wis., who is completing two years of service as president of the National Machine Tool Builders' Association, was host to the directors of the association on Sept. 11 at a dinner held at his home, where the business session also was held. Directors attending were: ROBERT M. GAYLORD, president, Ingersoll Milling Machine Co., Rockford, Ill.; C. R. BURT, president, Pratt & Whitney Co., Hartford, Conn.; FREDERICK V. GEIER, vice-president, Cincinnati Milling Machine Co., Cincinnati; G. E. RANDLES, president, Foote-Burt Co., Cleveland; HENRY S. BEAL, assistant general manager, Jones & Lamson Machine Co., Springfield, Vt.; FRED H. CHAPIN, president, National Acme Co., Cleveland; RICHARD A. HEALD, Heald Machine Co., Worcester, Mass. E. F. DUBRUL, Cincinnati, general manager of the association, also attended. E. J. FULLUM, Fellows Gear Shaper Co., Springfield, was unable to be present.

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LOUIS QUARLES, a director of the Harnischfeger Corpn., Milwaukee, has been elected secretary to fill the vacancy caused by the resignation of R. BINKOWSKI. H. S. STROUSE, formerly advertising manager, has been made treasurer, and J. O. FERCH, assistant advertising manager, has been promoted to advertising manager. D. B. PATTERSON, vice-president of the Harnischfeger Sales Corpn., has been elected a director and vice-president of the parent company.

▲▲▲ OBITUARY ▲▲▲

GEORGE H. VANT, Cincinnati district sales manager for the Carnegie Steel Co., Pittsburgh, died in an Indianapolis hospital on Sept. 17, following an accident sustained while parking an automobile. Mr. Vant was born at Ithaca, N. Y., 52 years ago and began his business career in the newspaper and advertising field. He went with the Carnegie company in December, 1906, and was assigned to the Cincinnati office a few years ago. He was

G. H. VANT

a member of the American Iron and Steel Institute, and was prominent in civic and social affairs at Cincinnati.

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WILLIAM H. BISSELL, Pacific Coast manager for the Wickwire-Spencer Steel Corpn., New York, was killed in an airplane crash at the Oakland airport, Cal., Sept. 16, as he was leaving for a business trip to Portland, Ore. He had been with the Wickwire organization for the past seven years and in charge of far Western operations for the past two years. Mr. Bissell was 47 years old.

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JOHN H. STAPLES, of the J. H. Staples Foundry Co., Mount Vernon, Ind., died after a long illness. He had operated his own foundry for the past nine years, after having been a department head for many years for the Keck-Gonnerman Co. He was 58 years old.

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A. D. QUINN, sales manager of the industrial division of the L. H. Gilmer Co., Philadelphia, died suddenly of heart disease on Sept. 17 while on a business trip in Chicago. He had been identified with the Gilmer company since 1919. He was 44 years old.

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S. HARRIS POMEROY, founder of S. H. Pomeroy Co., steel window frame manufacturer, New York, died at his home at New Rochelle, N. Y., Sept. 18, aged 74 years. He had not been active in the business for a number of years.

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DAVID O. RICHARDS, of Louis E. Emerman & Co., machinery dealers, Chicago, died in that city on Sept. 12, aged 59 years. He had been connected with the machine tool industry for the past 30 years.

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WALLACE MCCAUSLAND, general manager of sales of the Reading-Pratt & Cady Co., Inc., Bridgeport, Conn., died after a long illness on Sept. 4, aged 52 years. He was formerly identified with the Fairbanks Co., distributer of Pratt & Cady products, first as a salesman and later as manager of the piping, valves and fittings division in the Pittsburgh district. When the Pratt & Cady Co. severed its connection with the Fairbanks organization, Mr. McCausland was appointed district sales manager of Pratt & Cady in the Pittsburgh district. He held this position until 1928, when he was appointed to the position he held at the time of his death.

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August Lowest Month in Years for Sheet Steel

Activity in the sheet steel industry declined rather sharply during August in sales, production, shipments and unfilled orders, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers covering reports from independent mills. Both sales and production were the lowest in several years. Mill operations were reduced to an extent that the tonnage produced was slightly more than that sold.

Sales in August amounted to 122,849 tons, compared with 144,461 tons in July. Production was 123,752 tons, against 174,890 tons during the previous month. Shipments declined to 151,529 tons, against 178,460 tons during July. Unfilled orders were 43,000 tons less on Sept. 1 than on Aug. 1. The August report and comparison in net tons follow:

	August	July	June
Sales	122,849	144,461	163,599
Production	123,752	174,890	147,843
Shipments	151,529	178,460	156,160
Unfilled orders	170,122	203,358	304,197
Unshipped orders	74,245	83,006	92,395
Unsold stocks	75,288	77,953	75,618
Capacity per month	525,100	558,850	543,400
Percentage reporting	67.6	67.6	67.6
Percentages, Based on Capacity			
Sales	34.6	38.2	44.5
Production	34.9	46.3	40.3
Shipments	42.7	47.2	42.5
Unfilled orders	47.9	53.8	82.8
Unshipped orders	20.9	22.0	25.2
Unsold stocks	21.2	20.6	20.8

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Steel, iron and allied trades of central and northern California will hold an informal get-together meeting and golf tournament at the Sonoma Mission Inn on Saturday and Sunday, Sept. 26 and 27, under the auspices of the California State Chamber of Commerce.

Is This the "Darkness Before the Dawn"

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

FAVORABLE FACTORS

1. The P/V line has approached a normal level, suggesting that the physical volume of trade and prices are nearing a final readjustment.

2. Commodity price averages appear to be gradually stabilizing.

3. August machine tool orders gained.

4. Progress continues to be made in deflating production costs, including wage rates.

5. Indications are multiplying that artificial attempts to "stimulate" business have been definitely abandoned and that bankers, institutional investors, and "business leaders" are set for a thorough liquidation and readjustment.

6. Investment motives and the desire for income, as opposed to speculation and the desire for appreciation in price, are being reestablished.

7. The drastic steps taken by England to balance her budget (if carried out) may be considered constructive.

UNFAVORABLE FACTORS

1. Price maladjustments continue, with weakness in most basic raw materials.
2. Great uncertainty and lack of confidence.
3. Employment and payrolls declined in August, contrary to seasonal normal.
4. Farm conditions poor as ever, with chief cash groups in unfavorable position.
5. Foreign trade fell sharply in August to new low levels.
6. Numerous dividend cuts or omissions are disturbing.
7. Retail trade fell in August; department store sales at lowest point of recession.
8. Automobile production and sales continue to decline.
9. Building permits and contracts awarded declined in August.
10. Unfilled orders declining (steel, locomotives, machine tools, cotton cloth), and forward buying very low; domestic shipments of copper very small for the season.
11. Stocks of many commodities continue large; stocks of copper at a high record.
12. Continued declines in bond market and in stocks.

FOR the first time in the writer's experience he is unable to find a single statistical barometer which is definitely and positively "favorable." Machine tool orders increased in August, but less than in any August since 1926, and the unfilled orders fell very low. Zinc stocks were reduced, but not sufficiently to be reflected in the price. Stocks of cotton cloth were lower, but sales and unfilled orders were down also and are low.

Perhaps the nearest to a favorable indication of any broad significance is found in the action of commodity prices, the averages of which have recently shown little change and suggest a "tapering off" in the rate of decline. Even in this case, however, it remains true that each week most of the price changes in the more significant and sensitive commodities are downward, and so many maladjustments remain that the indications are not definitely favorable for the near future.

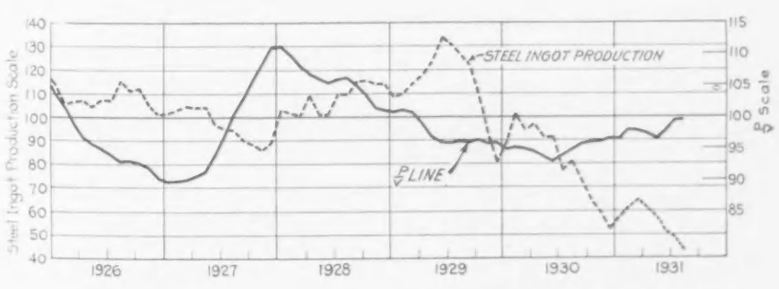
For the most part, the constructive features are negative, being in the nature of progress toward completing the readjustments required to restore equilibrium. Granting their necessity, every economy effected, and every cut in those prices or wages which are out of line with normal relations, represent a step toward restoring balance and laying a basis for recovery.

Looked at in this way, it may be said that the most fundamental development of the last month or two is the abandonment of speculative motives and inflationary devices, together with the acceptance of the truth that only by thorough deflation can inflation be eliminated and confidence restored.

This is healthy. Moreover, as in 1878 and in 1896, the experience with inflation will again probably have created a sort of anti-inflation serum in the body politic, which we may hope will destroy the destructive political germs now besetting us. Probably depressions like this establish a sort of immunity which holds for 10 to 20 years, and will save us from doles and inflationary bond issues now as they did from greenbackism and Bryanism in two similar periods in the past.

Perhaps the most fundamentally hopeful barometer is the P/V line. Our index of physical volume has declined a little more sharply than the average of commodity prices, thus bringing a gradual rise in the P/V ratio. This may indicate that supply is becoming better adjusted to demand. The decline in volume has not been sufficient to cause any real shortages or higher bids. Purchasing power is too low. Prices are not sufficiently readjusted to allow the quantity demanded to balance the quantity in supply.

But liquidation is clearly making progress and prices are nearing a firmer resistance level. The gradual "edging up" of the P/V line warrants hope that we are in the final stages of recession and that stabilization is only a matter of months.



IMPROVEMENT in the P/V line indicates approach to the end of recession. While encouraging, it is not conclusive as to a quick recovery.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

Steel Corporation Reduces Wages

IN reducing wage rates approximately 10 per cent, effective Oct. 1, the United States Steel Corpn. is not reversing its policy but is bowing to the dictates of circumstances. Throughout the current depression the Steel Corporation has done its utmost to protect the interests of its wage earners. It has alternated work among its employees so far as possible; its records show that for the period Oct. 1, 1930, to Aug. 31, 1931, the average number of its regular forces given employment was in excess of 94 per cent.

The wage rate reduction comes as a last resort. At the last quarterly meeting of the directors it was found necessary to reduce the common dividend from 7 per cent to 4 per cent, and to cut salaries 10 to 15 per cent, effective Aug. 15. If history is to be taken as a guide, the Steel Corporation will advance wages as soon as business conditions warrant. In 1921 there were three consecutive decreases. In 1922 wage rates were advanced 20 per cent; in 1923 there was another substantial increase in rates of pay, as well as a reduction in working hours.

For Stronger Trade Associations

IT is barely possible that if trade associations were stronger than they now are as a class, better progress would have been shown in meeting the problems of the depression. Nor would it have been sufficient merely that every industry of any consequence had its own coordinating body. What is needed are more association executives of a caliber that matches that of the heads of the member companies. Were there numbers of such industry organizations instead of the present few, and each of them under the direction of men individually capable of managing the businesses represented in the organization, much that President Swope of the General Electric Co. would have us accomplish by his proposal for industrial self-sufficiency might reasonably be consummated. There is need of association leadership armed with the authority of knowledge and owning the respect of the industrial leaders.

Whatever comes of the Swope plan (which was reviewed in these pages in the issue of Sept. 17), the trade association movement has been helped measurably by it. Industries without such organizations may see a new purpose in them. Nearer full support may be given in the other cases. Irrespective of whether or not the anti-trust laws are modified, the past furnishes evidence that progress can and has been made even when business has been hobbled. How much better progress is likely with a wider acceptance of the essentialness of the trade association. With it must come the engagement of a director of the highest proficiency.

In short, the association executive must possess all the statesmanship of the successful industrialist. He must be in part a student of economics and he must secure cooperation for the procedure which he believes to be best but which is commonly not necessarily the obvious. Many industries probably need the beneficent dictator, or the firm referee, one who points the path to be followed and does not have to consider what may be the decisions of the courts on any law involved.

Clear thinking in industry cooperation will make legislation a secondary consideration. With or without regard to changes in existing statutes, the trade association lifted to a high place of importance, properly supported by the industry and adequately operated by one who is a peer of the membership can do much at all times to stabilize. The association can be more than a statistical bureau and an advertising mechanism; it can become the adviser whose advice is prized.

Exit Fear, Enter Hope

THE abandonment of the gold standard in Great Britain brought out in bold relief the disastrous effects of fear on the world's credit structure. International capital, which had been growing increasingly timid as a result of the protracted world depression and the financial impasse in Germany, needed only the impetus of a British political crisis to throw it into a stampede away from the pound. The very steps taken to avoid the losses that would result if the Bank of England suspended gold payments made such action inevitable. Unrestrained fear begot what was feared.

Now that the worst has come to pass, the panic that brought it about should subside. The value of the pound has fallen and will doubtless cause many maladjustments, but the flight of gold from Great Britain has been stopped.

The adaptability and resourcefulness of the British on a changed monetary basis are counted on to prevent a ruinous depreciation of currency such as swept the old German mark into oblivion. After all, the resources of the British Empire, although temporarily paralyzed in various parts of the world by

frozen credits, are enormous. Moreover, the pound has previously departed from the gold standard and returned to it. Free gold payments were suspended during various London panics in the nineteenth century, during and after the Napoleonic wars, and from the inception of the last war until 1925.

The immediate effects of a decline in pound sterling are expected to be a stimulation of British export trade and a restriction of imports. British prices will fall faster in terms of foreign money, it is believed, than they will rise domestically in response to the inflationary effect of leaving the gold standard. If this proves to be the case, British economy may get the impulse necessary to pull it off dead center. Any convincing signs of recuperation in the original home of modern industry would react powerfully and beneficially on the psychology of the whole world.

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Steel Requirements Vary

ONE might perhaps suppose that in a prolonged depression all lines of steel consumption would get down to a sort of irreducible minimum, but if that were the case the minimums we do find would hardly be what one would expect. As there are reports available indicating consumption of steel in July in certain specific industries, and as seasonal variation must be considered, it is interesting to compare last July with July, 1929.

From July, 1929, to July, 1931, steel ingot production decreased by 61 per cent. Shipments of fabricated structural steel by the fabricators decreased only 36 per cent. Automobile production decreased 57 per cent. Class I railroads installed 6972 freight cars in June, 1929, and 9748 in July; this year they installed 603 in June while the detailed report for July is not available.

There is no coherence in these figures. Steel production was 39 per cent of what it was two years previous while fabricated structural steel shipments were 64 per cent. This year they ran 65 per cent higher in relationship to total steel production than in 1929. Automobile production ran 7 per cent above its 1929 proportion to steel. Freight car building became almost nothing.

It is impossible to divide steel consumption into classes of long use construction, short-use construction and current consumption or upkeep and find any coherence in the items entering into the different classes. While we find fabricated structural steel work doing relatively well, dwelling house construction has been doing very poorly indeed. The reason for the divergence is clear, money being available for the one and not for the other. The former includes Government money, as witness last week's items of the Chicago post office and New York parcels post building totaling over 70,000 tons of steel. There is no Government money for dwelling houses and the banks do not care to lend, partly in fear that dwelling house costs will have a tumble.

The automobile showing, comparing one July with another, is not conclusive. A more comprehensive comparison takes the first seven months of the year and this shows that automobile production was in 6 per cent lower ratio to steel in the first seven months of this year than two years previous. That is as to number of cars, and the average weight decreased, so that the amount of steel used and the money spent by the public decreased in greater ratio.

Another noteworthy complication is furnished by the oil and gas industry. Two years ago there was much drilling and much laying of line pipe. This year there has been little drilling but approximately the same amount of line pipe. Thus in what may be called a single industry there are divergences.

Tin plate is commonly cited as the most conspicuous case of common everyday consumption of steel. And years ago the theory was that it did well in depression because labor was then plentiful and cheap at the canneries while housewives did not have the capital to put things up. This year, however, the packs in general are restricted and in some sections housewives get fruit and vegetables for almost nothing.

The fact seems to be that there is no irreducible minimum in steel consumption. Some things are wearing out without being replaced and other things are being done not of absolute necessity but from desire. In periods of general activity practically everything has been more or less active, but there have been divergences then as well.

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Eighty Years Hence

The New York *Times* has rounded out its eightieth year. It came into being on Sept. 18, 1851, or nearly four years before the birth of THE IRON AGE. The younger paper congratulates the older on its long and distinguished career. The monumental achievements of the *Times* have won the plaudits of the publishing world.

In signalizing the fact of its reaching the four-score mark, it asked scientists and leaders in other fields of experiment to give their pictures of the world eighty years hence.

A surgeon such as Dr. W. J. Mayo sees the average span of life raised during the coming eighty years to the biblical three-score and ten. William F. Ogburn, chairman of the President's committee on social trends, believes that humanity's most versatile servant will be the electron tube; that there will be fewer farmers and more wooded land with wild life; that personal property in mechanical conveniences will be greatly extended. Henry Ford says that "perhaps our most progressive step will be the discovery that we have not made so much progress as the clatter of the times would suggest." Yet he feels the future is so full of promise as to make the present seem drab in comparison. "I believe," Mr. Ford adds, "we shall say less about social consciousness and begin to show evidence of actually having that of which we have only talked." Dr. Michael I. Pupin believes that the worker will be guaranteed an equitable share in the wealth produced by his work.

CORRESPONDENCE

Marketing the Steel House

To the Editor: We note that practically all information written with reference to the steel frame has to do with details of construction and is written primarily from the steel man's point of view. The appeal of the steel frame for residential work should be made to the average man who has no idea of the structural value of any material and who, in nine cases out of ten, depends upon some small architect, contractor or carpenter to recommend what he should have.

The organization or individual who can reach nearest to this prospect is the lumber yard or the building material merchant. This prospect needs, in practically all cases, a certain amount of financing; and the lumber yard or the building material man either finances this prospect or arranges a connection whereby financing can be done.

It seems to us that to put over the steel frame house idea, and to make it a commodity handled as lumber is handled, the merchants who are now handling lumber should be appealed to.

S. PERRY BROWN.
Vice-President, Beaumont Building Material Co.
Beaumont, Tex.

Metal Tops for Converting Motor Cars

To the Editor: The very interesting article on sheet steel by Leonard J. Lewery prompts me to send you the inclosed articles and photos, hoping that you may deem the idea of convertible metal tops to be sufficiently pertinent at this time of lagging steel operations to be dealt with in THE IRON AGE.

Discussion of the use of sheet steel for convertible automobile tops might be of particular value to both the steel and the automobile industries. The latter seems to be holding the steel industry back, due to the severely curtailed production of automobiles. This curtailment must continue if the public continues to postpone the purchase of new cars, except where replacement is imperative, and the public seems to be quite content to drive old cars until something very attractive is offered in new models of cars.

A metal-top convertible car would be such a novelty and so desirable as a second car that it should be easily sold to the average owner of a medium-to-high priced automobile. This would result in the automobile dealer securing much profitable business, since sales would seldom involve a "trade-in" of a used car, the idea being that this specialty car would be purchased solely to supplement the existing transportation of the well-to-do motorist. The desirability of a car that was quickly transformable from a metal top closed body to an open sport body cannot be controverted.

The steel industry might well sponsor such a development for the automobile to increase its business.

B. B. ELLERBECK.
Salt Lake City.

NOTE: The photographs referred to indicate that the top is lowered by merely sliding it back on metal tracks, which action also rotates it into the rear part of the car body. The construction is offered as an additional use of steel, replacing the convertible fabric unit.—*Editor.*

Each Industry Should Have Consumption Statistics

(*Concluded from page* 815)

danger of over-extended sales effort, wasteful and inconsequential practices, and economically unsound trade evils are less likely to creep in. And the manufacturers, instead of devoting themselves to efforts which result only in shifting volumes, will devote themselves to the development of new markets calculated to increase consumption.

Does Not Advocate Price Agreements

We do not advocate price agreements among manufacturers. Prices are governed by natural laws, and price agreements, aside from being illegal, are unsound economically. The same article when sold by one manufacturer may be worth more or less to the consumer than when sold by another because of surrounding circumstances. And those circumstances make themselves felt during the course of stabilization as an industry arrives at maturity and reaches the limits of normal consumption. And no two manufacturers make identical products. Consequently price agreements are fallacious.

The referee plan—that is, the plan of employing a disinterested referee from whom facts about consumption may be obtained by the industry—is the only plan which will make for intelligent management of standard competitive businesses and will give management a sound basis for determining the extent to which the individual plant is equipped to supply that share of normal consumption to which it has become entitled after years of competition.

The coal industry, through the United States Geological Survey, has access to general statistics on the basis of which it is possible for the individual producer to establish intelligent plans and policies. If it were possible for the Government to tabulate consumption statistics for all industries, this problem would be solved. But, in the absence of such an agency, it seems only reasonable that industries should take steps, by a plan such as has been outlined above, to provide each member with sufficient information as to his market to enable him to operate efficiently and intelligently.

In two large industries, baseball and motion pictures, the referee plan has been tried successfully. And it is possible, by providing a personal medium in whom each manufacturer has confidence, to stabilize any established standard industry just as Judge Landis has accomplished it for baseball, and Mr. Hays has done it for the motion picture industry.

Wage Cuts Come as Steel Demand Fails to Improve

SEASONAL Recovery Has Not Materialized — Ingot Output Down to 29 Per Cent — Automobile Outlook Less Promising

IRON and steel demand has subsided to the August level, and ingot production has receded from 30 per cent to 29 per cent of capacity. Prospective business in some directions, notably in public construction work, is still fairly promising, but in other lines and particularly the automobile industry the outlook has become increasingly obscure.

Generally speaking, iron and steel inventories in buyers' hands are very low, but they are nevertheless ample under present conditions and will probably remain so until there is a revival of demand based on expanding ultimate consumption. It is clear that Government undertakings and public utility projects, helpful as they are in supporting current iron and steel output, can not fill the gap left by the sharply curtailed purchases of the country at large.

SENTIMENT has no doubt been overstressed as a business influence during the current depression, but it is the belief of the steel trade that the mental attitude is today a factor of major importance. Abandonment of the gold standard in England and a reduction in steel wage rates here have helped to clear the atmosphere.

In announcing a cut of 10 per cent in common labor rates effective Oct. 1, the Steel Corporation and other steel producers bowed to the inevitable after weathering two years of slack operations. In finally recognizing the necessity of cutting the coat to fit the cloth, they have set a precedent which, it is now believed, the railroads must follow, whether they obtain partial relief through rate advances or not. Railroad buying programs are extremely slow in developing, and it seems unlikely that they can really get under way until the rate and wage questions are settled.

SOME rail inquiry has appeared, but it is a question how soon actual orders will be placed. It is possible that pressure for a reduction in the rail price may be stronger than it was a year ago. The only rail purchase reported recently is a small one—3000 tons of 130-lb. sections placed by the Delaware, Lackawanna & Western with the Bethlehem Steel Corpn. Meanwhile there is a carryover of rails purchased a year ago amounting to about 20 per cent of the total tonnage contracted for by the carriers. In railroad equipment, activity is confined to the placing of 2300 tons of steel for 300 cars to be built by the New York Central.

STRUCTURAL steel business is featured by the imminent award of more than 61,000 tons for a New Orleans bridge. The American Bridge Co. submitted the low bid on the main spans and the McClintic-Marshall Corpn. the low figure on the approaches. Lettings reported for the current week, at 12,000 tons, are the smallest since February. New projects to come out for figures, at 40,000 tons, compare with 37,000 tons last week and 20,000 tons two weeks ago.

Automobile production shows no signs of improvement, with the probability that the September total will fall below that of August and that October output will be even smaller. Retail sales have dropped sharply and some motor car makers have now deferred the bringing out of new models until December or January.

The seasonal decline in tin plate output has been arrested, with tin mill operations holding at 45 per cent, and production may soon benefit from the rolling of anticipated releases.

Pig iron demand is lethargic, but shipments from Chicago and Cleveland furnaces are reported to be running 15 per cent ahead of those of August.

PRICES are holding surprisingly well, although not subject to severe tests. Present quotations on bars, plates and shapes have been reaffirmed for fourth quarter and smaller contract buyers of those products, as well as of sheets, are closing for their fourth quarter requirements. Steel producers see no point in suggestions that the saving from wage cuts be passed on to buyers. They point out that what they gain through the reduction will probably fail to lift them out of the red. Current price weakness is restricted mainly to bolts and nuts and cast iron pipe.

THE IRON AGE composite prices are unchanged, finished steel at 2.116c. a lb., pig iron at $15.42 a ton and steel scrap at $9.17 a ton.

PITTSBURGH

Steel Ingot Production Declines to Lowest Level of the Year

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PITTSBURGH, Sept. 22.—With no improvement in demand for finished steel products and diminished releases in some lines, raw steel production in the Pittsburgh district has declined to the lowest level of the year, and from the percentage standpoint is comparable to the minimum producing rate of 1921. The slight gain in output that followed the low Labor Day week has been entirely lost, and production now stands at about 26 per cent of capacity. In some cases the larger interests are affected more adversely than the smaller companies.

A steel works blast furnace has been blown in, but two have been banked, leaving only nine active steel works furnaces and one merchant stack in operation in the district. Another independent steel company furnace will be blown in Oct. 1. Operations in the Wheeling district still average about 40 per cent, while in the Mahoning and Shenango Valleys production is not above 35 per cent in spite of the impetus which has been offered by recent large pipe awards.

With no improvement promised by the automobile industry in the next month or so, demand from the railroads is receiving greater emphasis. Rail inquiries from the Van Sweringen roads total 80,000 tons, and accessories for the same will probably be out in a few days. The New York Central and the Norfolk & Western are in the market for their fourth quarter steel needs, including several thousand tons of bars, plates and shapes. Present releases from the carriers are almost completely lacking. The local rail mill is still inactive.

No new pipe line developments are reported, although production against recent orders has risen, particularly in the Youngstown district. Electric weld and seamless mills will be well engaged for some weeks, and in a few cases are pushing output in an effort to make deliveries on pipe before cold weather sets in. Demand for oil country goods is stationary, and standard pipe has failed to show much seasonal pick-up.

The heavy construction industry is still taking reinforcing bars and structural steel at a fair rate, but new inquiry is appearing more slowly and demand may be expected to decline as cold weather approaches. A slight pick-up in movement of merchant wire products to the jobbing trade is reported, but no real demand can be expected before crops are harvested. Tin plate specifications seem to be a little better, and the decline in production, which has been continued for several weeks, seems to be checked at about 45 per cent of capacity. Sheet production this week will be lower, and strip mills are on minimum schedules.

Steel business has not only failed to improve, but in some respects has lost ground.

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Ingot operating rate for immediate Pittsburgh district is not above 26 per cent this week.

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Some of the larger interests are affected more adversely than small companies.

* * *

Fourth quarter prices, now announced on nearly all products, are receiving little test.

* * *

Scrap market retains its recent steadiness, but has not gained strength.

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Fourth quarter prices, although largely unchanged, are receiving little test in the present market. The smaller contract buyers of bars, plates and shapes are not backward about placing contracts, and sheet makers report a readiness on the part of consumers to cover at the new schedules. As these represent considerable advances over quotations in effect earlier in the year, the situation is pleasing to producers. Quotations on nails and wire are well maintained and strip steel is holding satisfactorily. Weakness continues on bolts, nuts and rivets.

SEMI-FINISHED STEEL

No important fourth quarter inquiry has appeared, and sellers expect little more activity than has characterized the market during the summer. The price of billets, slabs and sheet bars continues nominal at $29, Pittsburgh, while forging billets are quotable at $35. Makers of bolts, nuts and rivets, whose selling prices have declined rather sharply, are bringing some pressure against makers of wire rods for lower quotations. Mills have withstood this to date and continue to quote $35, Pittsburgh or Cleveland.

PIG IRON

Shipments to a few foundries this month are running a bit ahead of those of August, but demand in general shows very little change. No fourth quarter inquiry is appearing, and many buyers have sufficient business on their books to carry them well into the new quarter. Occasional carload sales are bringing the usual quoted prices.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$15.50 to $16.00
Bessemer	17.00
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Low phos., copper free	26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$16.00 to $16.50
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

RAILS AND TRACK SUPPLIES

The inquiry of the Van Sweringen roads for their 1932 rail requirements has been the feature of the market the past week. Thus far these carriers have not come out for their accessories, but this action normally lags somewhat behind rail inquiry. Current releases on both rails and accessories are very light. Considerable interest is being manifested in the 1932 rail price, but no intimation of a change has yet been heard.

BOLTS, NUTS AND RIVETS

Specifications this month are no heavier than they were during August, when minimum levels were thought to have been reached. Scarcely any demand from the railroads is reported, and the requirements of the automobile and farm implement makers are very light. Demand on the part of structural steel fabricators is making a better comparative showing than that of any other line. Large rivets seem to be well established at $28.50 a 100 lb., Pittsburgh, following the recent $5 a ton reduction, but bolts and nuts are very weak, and an additional discount of 10 per cent is by no means uncommon.

BARS, PLATES AND SHAPES

While some fourth quarter business is being closed, consumers are hesitant about buying specific tonnages, and most contracts merely call for nominal requirements. Specifications against old contracts are very light, and, with no change in price contemplated for the next three months, buyers are in no hurry about ordering out their tonnage. Structural inquiry is light in the immediate Pittsburgh dis-

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

	Sept.22, 1931	Sept.15, 1931	Aug.25, 1931	Sept.23, 1930
Pig Iron, Per Gross Ton:				
No. 2 fdy., Philadelphia	$16.26	$16.26	$16.76	$19.26
No. 2, Valley furnace	17.00	17.00	17.00	17.50
No. 2 Southern, Cin'ti	14.69	14.69	14.69	15.19
No. 2, Birmingham	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*	17.50	17.50	17.50	17.50
Basic, del'd eastern Pa.	16.75	16.75	16.75	18.75
Basic, Valley furnace	15.50	15.50	15.50	17.00
Valley Bessemer, del'd P'gh	18.76	18.76	18.76	19.76
Malleable, Chicago*	17.50	17.50	17.50	17.50
Malleable, Valley	17.00	17.00	17.00	18.00
L. S. charcoal, Chicago	25.04	25.04	25.04	27.04
Ferromanganese, seab'd carlots	†85.00	†85.00	†85.00	94.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh	29.00	29.00	29.00	31.00
Sheet bars, Pittsburgh	29.00	29.00	29.00	31.00
Slabs, Pittsburgh	29.00	29.00	29.00	31.00
Forging billets, Pittsburgh	35.00	35.00	35.00	36.00
Wire rods, Pittsburgh	35.00	35.00	35.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.70
Finished Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.93	1.93	1.93	1.98
Tank plates, Pittsburgh	1.60	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.88	1.88	1.88	1.88
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.85½	1.85½	1.85½	1.85½
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.55	1.55	1.55	1.65
Cold-rolled strips, Pittsburgh	2.15	2.15	2.15	2.35
Finished Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.45
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.50	2.50	2.50	2.55
Sheets, galv., No. 24, P'gh	2.90	2.90	2.90	3.00
Sheets, galv., No. 24, Chicago dist. mill	3.00	3.00	3.00	3.10
Hot-rolled sheets, No. 10, Pittsburgh	1.70	1.70	1.70	...
Hot-rolled sheets, No. 10, Chicago dist. mill	1.80	1.80	1.80	...
Wire nails, Pittsburgh	1.90	1.90	1.90	2.00
Wire nails, Chicago dist. mill	1.95	1.95	1.95	2.10
Plain wire, Pittsburgh	2.20	2.20	2.20	2.30
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.35
Barbed wire, galv., Pittsburgh	2.55	2.55	2.55	2.70
Barbed wire, galv., Chicago dist. mill	2.60	2.60	2.60	2.85
Tin plate, 100-lb. box, P'gh	$5.00	$5.00	$5.00	$5.25
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$10.75	$10.75	$10.50	$15.75
Heavy melting steel, Phila.	8.50	8.50	8.50	13.00
Heavy melting steel, Chicago	8.25	8.25	8.25	12.50
Carwheels, Chicago	9.50	9.50	9.50	13.50
Carwheels, Philadelphia	12.00	12.00	12.00	15.00
No. 1 cast, Pittsburgh	10.50	10.50	11.00	13.50
No. 1 cast, Philadelphia	11.50	11.50	11.50	13.00
No. 1 cast, Ch'go (net ton)	8.50	8.50	9.00	11.00
No. 1 RR. wrot., Phila.	10.00	10.00	10.00	15.00
No. 1 wrot., Ch'go (net)	7.00	7.00	7.00	10.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.40	$2.40	$2.40	$2.60
Foundry coke, prompt	3.50	3.50	3.50	3.50
Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	7.37½	7.62½	7.87½	10.50
Electrolytic copper, refinery	6.75	7.00	7.25	10.25
Tin (Straits), New York	23.37½	25.45	26.35	29.75
Zinc, East St. Louis	3.70	3.75	3.80	4.25
Zinc, New York	4.05	4.10	4.15	4.60
Lead, St. Louis	4.22½	4.22½	4.22½	5.35
Lead, New York	4.40	4.40	4.40	5.50
Antimony (Asiatic), N. Y.	6.50	6.60	6.60	7.62½

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discounts.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

trict, and little business is being placed. Some miscellaneous work is under contemplation, but fabricators find it slow in closing. The American Bridge Co. and the McClintic-Marshall Corpn. were low bidders on the principal tonnages involved in the Mississippi River bridge at New Orleans.

Demand for reinforcing bars has declined seasonally, but some new contracts are being placed. Merchant bars are very quiet, but some plate tonnage is originating from the railroads. Several mills shared in the plates and other material required by the New York Central for the building of 300 freight cars at its Avis, Pa., shops. The New York Central has recently come into the market for its fourth quarter steel requirements, on which bids will be taken Sept. 30. The Norfolk & Western will take bids on 2500 tons of bars, plates and shapes on Sept. 29. No change is reported in the price structure, and the 1.60c., Pittsburgh, quotation seems to be well maintained on current tonnage.

TUBULAR GOODS

With several large pipe line awards reported last week, the market has become very quiet and little additional tonnage of this sort is expected to come before the trade this season. Electric weld and seamless mills are now fairly well supplied with tonnage for the next few weeks and, in some cases, orders are being pushed for early delivery. The majority of the lapweld units in the industry are idle, and buttweld capacity is not engaged at more than 25 per cent. The usual fall increase in buttweld demand has materialized only in a very limited way. No improvement is reported in movement of oil country goods, and buyers in the fields are still pursuing an attitude of watchful waiting.

WIRE PRODUCTS

Releases continue to run somewhat ahead of those of August, and a little new buying is reported. Most of this is coming from the merchant trade, as demand for manufacturers' is extremely dull. Prices for fourth quarter are now definitely established at 2.20c. on manufacturers' wire and $1.90 a keg on nails. On the latter product this represents an advance of 10c. a keg over the price at which most shipments were made during the present quarter.

SHEETS

Specifications for sheets have been lighter in the last few days, but releases earlier in the month enabled some mills to report a slightly better output during the last week. Recent tonnage does not justify a maintenance of this rate. Miscellaneous demand is exceptionally dull, and none of the principal consuming industries is taking more than 25 per cent of its normal requirements. Shipments to the automobile industry this month promise to be practically as low as in August, and the chances of betterment in October are small.

The most encouraging thing about the market is the price situation, which is reported by almost all makers to be very satisfactory. Consumers are now generally willing to cover their fourth quarter requirements at the present quotations, and the new classifications are well understood by the majority of buyers. Galvanized sheets are quoted at 2.90c., Pittsburgh; hot-rolled annealed at 2.40c.; hot-rolled at

THE IRON AGE COMPOSITE PRICES

	Finished Steel	Pig Iron	Steel Scrap
Sept. 22, 1931	2.116c. a Lb.	$15.42 a Gross Ton	$9.17 a Gross Ton
One week ago	2.116c.	15.42	9.17
One month ago	2.116c.	15.50	9.08
One year ago	2.149c.	16.46	13.75
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1931	2.142c., Jan. 13	2.102c., June 2	$15.90, Jan. 6	$15.42, Sept. 8	$11.33, Jan. 6	$9.08, June 23
1930	2.362c., Jan. 7	2.121c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 2
1928	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

1.70c., with a 15c. extra for annealing; auto body sheets at 3.10c., and steel furniture sheets at 2.75c. for the No. 10 gage.

OLD MATERIAL

A sale of No. 1 heavy melting steel into consumption at $10.75 seems to represent a compromise on the part of mills which were willing to pay $10.50 and dealers who still sought $11. However, railroad steel is still being picked up by dealers at as high as $11. With no sale of hydraulic compressed sheets to test the market, dealers' offering figures are indicative of a parity with steel. Bundled sheets are reported to have been sold at more than $10, but buyers are now out of the market. Specialties are weaker. The blast furnace grades are holding at $7 to $7.50. However, with the blowing in of an independent steel company stack on the first of the month, a new market may be created which will bring further strength to this grade. No. 1 cast is in light demand, but recent sales into consumption have brought as high as $11 for the best quality material.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$10.50 to $11.00
No. 2 heavy melting steel	9.75 to 10.25
Scrap rails	10.75 to 11.25
Compressed sheet steel	10.50 to 11.00
Bundled sheets, sides and ends	9.50 to 10.00
Cast iron carwheels	10.50 to 11.00
Sheet bar crops, ordinary	11.00 to 11.50
Heavy breakable cast	8.00 to 8.50
No. 2 railroad wrought	10.50 to 11.00
Hvy. steel axle turnings	9.50 to 10.00
Machine shop turnings	7.50 to 8.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	12.00 to 12.50
Railr. coil and leaf springs	12.00 to 12.50
Rolled steel wheels	12.00 to 12.50
Low phos. billet and bloom ends	14.00 to 14.50
Low phos. mill plates	12.00 to 12.50
Low phos. light grades	12.00 to 12.50
Low phos. sheet bar crops	13.00 to 13.50
Heavy steel axle turnings	9.50 to 10.00
Electric Furnace Grades:	
Low phos. punchings	13.00 to 13.50
Heavy steel axle turnings	9.50 to 10.00
Blast Furnace Grades:	
Short shoveling steel turnings	7.00 to 7.50
Short mixed borings and turnings	7.00 to 7.50
Cast iron borings	7.00 to 7.50
Rolling Mill Grades:	
Steel car axles	16.50 to 17.50
Cupola Grades:	
No. 1 cast	10.00 to 11.00
Rails 3 ft. and under	12.50 to 13.00

STRIP STEEL

Releases last week were exceptionally light and present operating schedules are at as low a point as has been reached this year. Production of hot-rolled strip is not above 25 per cent of capacity, and cold-rolled output is considerably less. The automobile industry is placing little tonnage for October, and it is authoritatively reported that one of the principal makers of low-priced cars will close its plants at the beginning of the month for an indefinite period.

TIN PLATE

Production has held its own during the past week at about 45 per cent of capacity, but slightly heavier releases are reported by some makers. This would indicate that the decline in operations, which has continued for at least two months, may at last have been checked. Production will also soon benefit from anticipated output, but rolling of this tonnage will be postponed as long as possible in order to bolster payrolls during cold weather. No intimation of the 1932 price is expected for several weeks.

COKE AND COAL

A Pittsburgh district steel company is negotiating for its furnace coke requirements over the next six months, and the business is expected to be placed at any time. The inquiry calls for average shipments of 700 tons daily. Outside of this there is no activity in the furnace coke market, and the foundry grade is as dull as it has been. Heating coke showed a slight upturn early in the month, but dealers have been unable to move the material stocked at that time, and further activity awaits colder weather.

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Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.10c.
Squares and flats	3.60c.
Bands	2.95c.
Hoops	3.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.40c.
Hot-rolled sheets (No. 10)	3.15c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	3.74c.
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	3.00c.
Track bolts, all sizes, per 100 count,	70 and 10 per cent off list
Machine bolts, 100 count,	70 and 10 per cent off list
Carriage bolts, 100 count,	70 and 10 per cent off list
Nuts, all styles, 100 count,	70 and 10 per cent off list
Large rivets, base per 100 lb.	$3.20
Wire black, soft ann'l'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb.	2.75
Common wire nails, per keg	2.05
Cement coated nails, per keg	2.05

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

Detroit Scrap Market Almost at Standstill

DETROIT, Sept. 22.—The scrap market is virtually at a standstill. Although prices are unchanged, they are largely nominal. The only transactions have been small purchases by dealers who already have substantial stocks in local yards.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$6.50 to $7.00
Borings and short turnings	4.50 to 5.00
Long turnings	4.00 to 4.50
No. 1 machinery cast	8.00 to 8.50
Automotive cast	11.00 to 11.50
Hydraul. comp. sheets	6.25 to 6.75
Stove plate	5.00 to 5.50
New No. 1 busheling	5.25 to 5.75
Old No. 2 busheling	3.25 to 3.75
Sheet clippings	3.50 to 4.00
Flashings	5.50 to 6.00

CHICAGO

Tangible Evidences of Improvement Are Slight and Indicate No Trend

CHICAGO, Sept. 22.—The Chicago iron and steel market remains drab, there being no tangible evidence of a change for the better. Blast furnace operations are unaltered, with nine stacks blowing out of 36 in the district. At this rate of steel mill pig iron production, the make is somewhat in excess of actual requirements and stocks are slowly growing larger. Although there is usually a slight variation in ingot output between the first part of the week and the closing days, the average remains between 28 and 29 per cent of capacity, thereby once again giving evidence of the market's inability to rebound from the summer dullness.

New buying is on a somewhat larger scale and specifications are more liberal, but their cumulative effects are poor indicators of an improved demand. The structural market is very quiet, and tank builders are not able to sustain output above 25 to 30 per cent of capacity. However, there is a slight improvement in inquiries for tanks, and this market has some prospect for improvement. Reinforcing bar fabricators report inquiries more brisk than in many months, and a significant feature of this turn in affairs is that an appreciable tonnage of private work is coming out for figures.

More delays are in sight for Illinois State work, following word from Springfield that a court has declared the prevailing rate of wage law to be unconstitutional. This is subject to appeal and, as a consequence, over $3,000,000 worth of road work will be postponed until next year.

Western rail programs are very slow in developing, and sellers are of the opinion that important buying is still some distance in the future.

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Iron and steel market has failed to rebound from dullness of midsummer.

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Evidences of gains in some lines are so slight as to give no convincing indication of upward trend.

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Steel ingot output for district will be 28 to 29 per cent this week.

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About $3,000,000 worth of Illinois road work postponed until next year by court decison.

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Shipments of pig iron thus far in September are 15 to 20 per cent ahead of August rate.

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FERROALLOYS

Sales of spot tonnages are almost wholly lacking in this market, and specifications thus far in September have been averaging only a shade higher than in August. Prices are steady.

PIG IRON

A slight improvement is noted in foundry melt, but the change is spotty and it is seldom that gains are held for any length of time. Shipments of Northern foundry iron thus far in September are from 15 to 20 per cent heavier than in August, which, with July, now appears to have been the low point of the year. New buying is on a small scale, and there are no indications that there will be a buying movement of size for the fourth quarter. Prices of Northern iron are steady at $17.50 a ton, local furnaces. The Southern iron market is quiet, with prices well established at $11 a ton, Birmingham. Spot sales of silvery are dull, with prices still showing some variation, especially when this commodity reaches Chicago by boat. Demand for charcoal iron remains light, and producers' stocks are being liquidated very slowly.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	$25.04 to 27.04
S'th'n No. 2 fdy.	17.01
Low phos. sil. 1 to 2, copper free	28.50 to 29.20
Silvery, sil. 8 per cent	24.79 to 26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including an average switching charge of 61c. per gross ton.

WAREHOUSE BUSINESS

Distribution remains dull and far below what is normally expected in September, which is showing little or no improvement over the previous month.

STRIP STEEL

Transactions in cold-rolled strip remain very light, and output for the country as a whole cannot be measured above 15 per cent of capacity. A few inquiries are out for fourth quarter tonnages and here and there a contract has been signed, but this phase of the market is exceptionally dull, considering the time of year. The movement of hot-rolled strip is light in all directions, including automobile frame plants. Prices for both hot and cold strips are steady.

BOLTS, NUTS AND RIVETS

September shipments to date are not averaging above the rate that prevailed in August. Contracting for the fourth quarter is on a sharply restricted basis. Variations in prices are still a major topic in this market. Here and there an automobile manufacturer is taking larger quantities. Most of the productive capacity of farm implement plants remains idle, with a slight promise that output will be raised by a small margin some time after Oct. 15. Railroad use of bolts and nuts is light.

BARS

Interest in fourth quarter requirements is slight. Consumers, almost without exception, are taking only small mixed lots for immediate consumption. A 500-ton lot of bars has been purchased for caisson rings that will be needed in the construction of the Chicago Post Office. Specifications for alloy steel bars stand near the average of the early part of the month. A change in demand from the automotive industry is not reflected on order books of local steel mills, and there is no change in the attitude of farm implement manufacturers, some of whom are now said to have in mind resuming output on about a 25 per cent basis some time after mid-October. The iron bar market is dull and promises to remain that way so long as railroad equipment programs are absent and repair shops are subject to part-time operations. Sellers of rail steel bars have opened fourth quarter books at 1.60c. a lb., Chicago Heights mills, but consumers of this commodity have experienced no improvement in business and are showing extreme caution both in orders for immediate delivery and in commitments for the future. Demand from furniture and bed manufacturers is dull in an off-season period.

RAILS AND TRACK SUPPLIES

Rail rolling programs on old contracts are about completed, and by the end of the month releases now at hand will have been shipped. It is of interest that a fair estimate of the carryover tonnage is about 20 per cent, which is impressive in view of the fact that purchases for 1931 were far short of those for the previous year. It is reported that the Louisville & Nashville is expected to come into the market for 50,000 tons of rails, and the Lackawanna is said to be placed 3000 tons with Bethlehem Steel Co. for rolling in the week of Oct. 19. The Denver & Salt Lake Western has been granted permission to build a 42-mile cut-off between Dotsero and Orestod, Colo. This line is to be completed within two years.

The track accessory and light rail markets are quiet.

CAST IRON PIPE

Word comes from Milwaukee that action will not be taken until Sept. 30 on the purchase of 2000 tons of 24 to 56-in. Class C pipe and specials. On bids opened Sept. 11, United States Pipe & Foundry Co. was low at $34 a ton, delivered, or $25.60 a ton, Birmingham, if given the entire contract. McWane Cast Iron Pipe Co. has taken 3600 ft. of 6 to 10-in. Class C pipe for delivery to Ironwood, Mich. Oakhill, Ohio, has opened bids on 10,000 ft. of 8-in. The published quotations on cast iron pipe are now nominal, as sellers gradually lower bids in efforts to take their full share of tonnages that are before the trade. Inquiries are small in size and few in number. This is not an unusual condition at this time of year because cold weather and the end of active pipe-laying operations are in sight in the Northern part of the country. The Sanitary District project is the only large job in the immediate Chicago area.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $41 to $43; 4-in., $44 to $46; Class A and gas pipe, $3 extra.

SHEETS

Local hot mills, in producing at about 30 per cent of capacity, are subsisting on miscellaneous small-lot business that is mixed in character. Jobbers' stocks are low, but in view of restricted warehouse sales there seems to be no reason to expect them to be expanded. Forward contracting is very slow, notwithstanding the fact that tonnages carried over from third quarter will in all probability be small. Cabinet, roofing and container manufacturers are experiencing a dull season, with little of the market stimulation that usually is to be expected in September.

Base prices per lb., deliv'd from mill in Chicago: No. 24 hot-rolled annealed, 2.55c.; No. 24 galv., 3.05c.; No. 10 hot-rolled, 1.85c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

PLATES

Most of the news in the local plate market centers around the large diameter pipe field. Shipment of plates to a nearby pipe mill for a portion of the Stanolind line is expected to begin in a few days. This will be of material aid to plate manufacturers, as production in this district has been at a very low level. Several miscellaneous inquiries for tanks and short pipe lines call for 15,000 tons of steel. The Prairie Pipe Line Co. has plans for laying a branch from its trunk line to Fort Worth, Tex. The New York Central will open bids Sept. 30 on fourth quarter needs of plates and other finished steel. The situation as to tank fabricators is much the same as it is with structural steel shops, output being in the range from 25 to 30 per cent of capacity. It is reported that the Mississippi Valley Barge Line, operating between New Orleans and Ohio River points, will soon enter the market for 10 to 40 steel barges.

REINFORCING BARS

This market offers, from the tonnage viewpoint, more encouragement than at any time in the past six or eight months. An increasing portion of pending work is being undertaken by private enterprise. As to prices, this market is still in a badly mixed and weakened condition. Recent lettings of public work remain in satisfactory volume, though this part of the market is destined to drop away as cold weather approaches and road work comes to an end. Much of the private work before dealers consists of industrial and warehouse projects. Apartment construction in the Chicago area remains very dull.

STRUCTURAL MATERIAL

Both inquiries and awards have fallen off rather sharply, and the market looks less promising than earlier in the month. The American Bridge Co. is low and is expected to get 20,000 tons for the river spans of the bridge to be built near New Orleans. There remains some uncertainty as to the disposition of the 40,000 tons that will be needed for the approaches. Prices of plain material to fabricators lack strength.

WIRE PRODUCTS

Producers of wire and wire products are still laboring under unfavorable market factors that have held in check not only an increase in late summer demand, but are now influencing purchasers to withhold commitments for the fourth quarter. Use of nails in all directions is light. Field fencing is moving in small volume. Demand for heavy electrical wires is showing no improvement, though needs of magnet wire by radio manufacturers are a trifle heavier. The continuance of warm weather is resulting in an unusually late movement of substantial quantities of wire mesh for concrete reinforcement and also some new commitments that might reasonably be expected to be held over until next spring. Prices remain quite steady in the face of mill output that is in the range from 25 to 30 per cent of capacity.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforcing bars, billet steel	1.55c. to 2.00c.
Rail steel reinforcement—	
For buildings	1.25c. to 1.55c.
Highway slabs	1.50c.
For bridges and culverts	1.65c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.10c.
Flats and squares	3.60c.
Bands, ¼ in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes (⅜ in. and larger)	3.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Coach and lag screws	73
Hot-pressed nuts, sq., tap. or blank	73
Hot-pressed nuts, hex., tap. or blank	73
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

OLD MATERIAL

The Chicago scrap market remains dull, with the bulk of transactions of small size and often involving distress tonnage. Quotations on heavy melting steel are steady in the range from $8 to $8.50 a gross ton, delivered to consumers' yards. New transactions are small in size, in keeping with steel mill operations which are not above 30 per cent of capacity. Demand by foundries remains very light, and prices on these grades are nominal. Lists being offered by railroads are small for the reason that prices bid are not attractive to the railroads. Industrial plants are inclined to dispose of the small tonnages that they are able to accumulate.

Prices del'd Chicago dist. consumers:

	Per Gross Ton	
Basic Open-Hearth Grades:		
Heavy melting steel	$8.00 to	$8.50
Shoveling steel	8.00 to	8.50
Frogs, switches and guards, cut apart, and misc. rails	8.00 to	8.50
Factory hyd. comp. sheets	6.50 to	7.00
Drop forge flashings	6.00 to	6.50
No. 1 busheling	6.00 to	6.50
Forg'd cast and r'l'd steel carwheels	8.50 to	9.50
Railroad tires, charg. box size	10.50 to	11.00
Railroad leaf springs cut apart	10.25 to	10.75
Axle turnings	6.75 to	7.25
Acid Open-Hearth Grades:		
Steel couplers and knuckles	9.00 to	9.50
Coil springs	10.50 to	11.00
Electric Furnace Grades:		
Axle turnings	7.25 to	7.75
Low phos. punchings	11.50 to	12.00
Low phos. plates, 12 in. and under	10.00 to	10.50
Blast Furnace Grades:		
Cast iron borings	4.00 to	4.50
Short shoveling turnings	4.00 to	4.50
Machine shop turnings	4.00 to	4.50
Rolling Mill Grades:		
Rerolling rails	10.00 to	10.50
Cupola Grades:		
Steel rails, less than 3 ft.	10.25 to	10.75
Steel rails, less than 2 ft.	11.00 to	11.50
Angle bars, steel	9.25 to	9.75
Cast iron carwheels	9.50 to	10.00
Malleable Grades:		
Railroad	7.50 to	8.00
Agricultural	7.50 to	8.00
Miscellaneous:		
*Relaying rails, 56 to 60 lb.	19.00 to	21.00
*Relaying rails, 65 lb. and heavier	22.00 to	27.00
	Per Net Ton	
Rolling Mill Grades:		
Iron angle and splice bars	8.50 to	9.00
Iron arch bars and transoms	9.00 to	9.50
Iron car axles	15.50 to	16.50
Steel car axles	12.00 to	12.50
No. 1 railroad wrought	7.00 to	7.50
No. 2 railroad wrought	7.00 to	7.50
No. 1 busheling	5.50 to	6.00
No. 2 busheling	4.00 to	4.50
Locomotive tires, smooth	11.50 to	12.50
Pipes and flues	5.50 to	6.00
Cupola Grades:		
No. 1 machinery cast	8.50 to	9.00
No. 1 railroad cast	7.00 to	7.50
No. 1 agricultural cast	7.00 to	7.50
Stove plate	6.25 to	6.75
Grate bars	5.50 to	6.00
Brake shoes	5.75 to	6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

CLEVELAND

September Business Disappointing—Operations in District Gain Slightly

CLEVELAND, Sept. 22.—There were no developments in the iron and steel market during the week to offer encouragement to expectation of an early improvement in the situation. A little better demand for sheets was reported by one or two mills, but activity in other products continued at a low level. September business is disappointing, and with some mills the volume so far this month has been barely up to that for the same period in August.

Local steel plant operations were increased during the week by the addition of one open-hearth furnace by an independent mill. The Cleveland plants are operating this week at 32 per cent of capacity.

While finishing mill schedules are somewhat irregular, local sheet and strip mills are operating this week.

Business from the motor car industry is limited largely to small fill-in lots. While some of the stamping plants in this territory have taken new orders for automobile parts, little gain in tonnage from the motor car industry is expected until the Ford and Chevrolet companies come in the market for steel for their new models of cars. This business should stimulate activity in October.

IRON ORE

Shipments of Lake Superior ore this season have been reduced to an extent that stocks are only slightly larger than a year ago. The amount at furnaces and Lake Erie docks Sept. 1 was 35,071,201 tons, against 34,938,012 tons on the same date last year. Furnace stocks Sept. 1 were 29,385,450 tons. Less than half as much ore was consumed in August as in the same month last year. Furnaces used 1,652,247 tons last month, a loss of 180,135 tons, compared with July. Central district furnaces used 874,136 tons last month, a decrease of 88,090 tons. Lake front furnaces melted 757,358 tons, a decrease of 88,301 tons, and all-rail furnaces used 12,356 tons, a loss of 5887 tons. Eastern furnaces melted 8397 tons, an increase of 2143 tons. There were 68 furnaces using Lake ore in blast Aug. 31, a decrease of five for the month.

PIG IRON

Shipments this month are running somewhat better than in August, one leading producer reporting a 15 per cent increase for September. However, new business continues very light, the volume of sales so far this month being about the same as for the same period during August. Few consumers are showing an interest in fourth quarter contracts, and little inquiry is pending. Most business is in small lots for early needs. With the start of production on new car models, the automotive industry in the Michigan territory expects to take more iron during September than in August. Prices are being well maintained at the regular quotations of $16 to $17, Lake furnace, for foundry and malleable iron for Ohio and Indiana shipment, $17 to $17.50 for Michigan delivery, and $17, Cleveland, for local shipment.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$17.00
S'th'n fdy., sil. 1.75 to 2.25	17.01
Malleable	17.50
Ohio silvery, 8 per cent	25.00
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; $3 from Jackson, Ohio; $6.01 from Birmingham.

SHEETS

A slight improvement in orders during the week is reported by some of the mills. Some business came from stamping plants that have taken contracts for parts for new automobile models and also from the grave vault, washing machine and stove industries. Part of the business was taken for October shipment and a little for November. The local Fisher body plant is winding up production on old models of Chevrolet bodies, and it is understood will begin production of some parts for the new design bodies without a complete shutdown period. While orders for steel under new specifications for the new bodies have not been placed, it is stated that there will be no change in some of the body members. Regular prices are being maintained and mills that previously had not reaffirmed present prices for the last quarter have opened their books for that delivery at the prevailing prices.

STRIP STEEL

Some inquiry for hot and cold-rolled strip came out during the week from manufacturers of automobile parts and accessories who are figuring on work in connection with new models of automobiles. However, very little new business was placed. Prices appear firm at 1.55c., Pittsburgh, for wide and 1.65c. for narrow hot-rolled strip, and 2.15c., Cleveland, for cold-rolled strip, and these prices are being quoted for the fourth quarter.

COLD-FINISHED STEEL BARS

Mills have opened their books for the fourth quarter at the present 2.10c., Cleveland, price. Specifications continue very light.

FLUORSPAR

Activity in domestic fluorspar is confined to single car orders, which are being taken at $13, mine, a net ton. A reduction of $2.50 has been made on No. 1 ground bulk fluorspar, which is now quoted at $30 a ton.

BARS, PLATES AND SHAPES

Demand for these products still is light. No structural work of any size came out during the week. Cleveland will have plans out shortly for a sewage disposal plant and an underground exhibition hall, each requiring a good tonnage of reinforcing bars, reinforced concrete having been decided on for the latter structure. Bids for two public jobs, a local sewer and a highway bridge in Bedford requiring 2800 tons of bars are being taken this week. One mill has opened its books for the fourth quarter at present prices and another is naming these prices without making any formal announcement. Steel bars are quoted at 1.65c., Cleveland, for local delivery and outside shipment and plates and shapes at 1.60c., Pittsburgh.

BOLTS, NUTS AND RIVETS

Bolt and nut makers have opened their books for the fourth quarter at the present discount of 73 and 10. Orders scarcely are holding up to the August volume. Rivet manufacturers are closing fourth quarter contracts at the new $2.50 per 100-lb. price for large rivets.

OLD MATERIAL

Valley mills have not resumed the taking of shipments, and activity is confined to purchases by dealers of blast furnace scrap for a Cleveland mill. While the recently prevailing quotations are being paid for this scrap, the supply is not plentiful because of reduced production. Quotations are unchanged.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	$8.50 to	$9.00
No. 2 heavy melting steel	7.50 to	8.00
Compressed sheet steel	7.50 to	7.75
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	6.75 to	7.00
Machine-shop turnings	5.00 to	5.50
Short shoveling turnings	6.50 to	7.00
No. 1 railroad wrought	9.50 to	10.00
No. 2 railroad wrought	10.00 to	10.50
No. 1 busheling	6.75 to	7.00
Pipes and flues	5.50 to	6.00
Steel axle turnings	7.50 to	8.00
Acid Open-Hearth Grades:		
Low phos., billet bloom and slab crops	14.00 to	14.50
Blast Furnace Grades:		
Cast iron borings	6.50 to	6.75
Mixed borings and short turnings	6.50 to	6.75
No. 2 busheling	6.00 to	6.25
Cupola Grades:		
No. 1 cast	10.00 to	10.50
Railroad grate bars	6.00 to	6.50
Stove plate	6.00 to	6.50
Rails under 3 ft	15.00 to	15.50
Miscellaneous:		
Rails for rolling	13.00 to	13.50
Railroad malleable	11.00 to	11.25

NEW YORK

No Perceptible Improvement in Demands for Pig Iron and Steel

NEW YORK, Sept. 22.—The local pig iron market continues to reflect abnormally quiet conditions among district melters. Total sales, at 3500 tons, compare with 3000 tons for the previous week and 3000 tons two weeks ago. Open inquiry is scarce, and interest in new purchases is developed only by intensive solicitation. A local consumer is in the market for 1000 tons for fourth quarter shipment, with the remainder of prospective business restricted to small lots. Foundry operations, which recently showed some improvement over activity during July and August, are not being sustained broadly enough to lend encouragement to the general situation. Prices are generally held to schedules.

Prices per gross ton, delivered New York district:

*Buff. No. 2, del'd east. N. J.	17.78 to 18.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	16.89 to 17.39
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	17.89 to 18.39

Freight rates: $1.39 to $2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

CAST IRON PIPE

Fresh inquiry for pressure pipe continues to taper off, with only two new projects in immediate prospect. Spencerport, N. Y., requires 14,000 ft., on which sizes will be specified shortly, and Princeton, N. J., is in the market for about 200 tons of small sizes for a sewage disposal system. The only public awards reported for the week were 500 tons of 12-in. for Phoenix, N. Y., to Central Foundry Co., and a similar amount of 12 and 16-in. centrifugal pipe for Hartford, Conn., to Warren Foundry & Pipe Corpn.

Prices per net ton delivered New York: Water pipe, 6-in. and larger, $32.90; 4-in. and 5-in., $35.90; 3-in., $42.90. Class A and gas pipe, $3 extra.

FINISHED STEEL

No perceptible change has occurred in the flow of steel orders and specifications from consumers in the New York district. Sales totals for September will about balance the amounts booked in August, which was an extremely poor month. Although spotty gains have occurred in some items or in some offices, these are not large enough nor sufficiently prevalent to indicate a genuine upward trend in consumption.

The outstanding business of the week was the placing of about 2300 tons of plates, bars and small shapes by the New York Central for 300 cars it will build in its shops at Avis, Pa., and an order for 3000 tons of rails for the Delaware, Lackawanna & Western Railroad, which went to the Bethlehem Steel Co. Steel probably will be bought soon for 200 additional cars that will be built for the New York Central road in the Merchants' Despatch shops at Rochester, N. Y. This road has invited bids on its fourth quarter steel requirements.

With the announcement by a number of mills that fourth quarter prices on plates, shapes and bars will be unchanged from the present schedule, nearly all products have been put in a position for fourth quarter contracting. However, consumers appear to be very little interested, and few contracts have thus far resulted. The stability and regularity of quotations are pronounced characteristics of the current situation.

REINFORCING BARS

Quotations are unchanged at 1.60c., Pittsburgh, or 1.93c., New York, with concessions of $1 and more a ton, on sizable projects. The Pilgrim State Hospital at Brentwood, N. Y., on which Brady Concrete Co. is low bidder for the general contract, will require 1220 tons of bars, instead of 500 tons, as previously reported. Three State highway projects in New Jersey will require a total of about 650 tons.

OLD MATERIAL

Buying of all grades of scrap is generally limited to carload lots, with consumers in many cases offering to buy only at reductions of 25c. to 50c. a ton from previous purchase prices. No. 1 heavy melting steel continues to move to the consumer at Coatesville, Pa., and by barge to Buffalo, and heavy breakable cast scrap is being shipped to Phoenixville and Coatesville, Pa. Otherwise, there is little activity. Prices lack firmness.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$5.00 to $6.25
Heavy melting steel (yard)	3.00 to 3.50
No. 1 hvy. breakable cast.	6.50 to 7.00
Stove plate (steel works)	4.00
Locomotive grate bars	4.00
Machine shop turnings	2.00 to 2.50
Short shoveling turnings	2.50
Cast borings (blast fur. or steel works)	2.50 to 3.00
Mixed borings and turnings	2.00
Steel car axles	12.75 to 13.00
Iron car axles	15.00 to 15.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)	5.50 to 6.00
Forge fire	3.25 to 3.75
No. 1 railroad wrought	8.25
No. 1 yard wrought, long	7.25
Rails for rolling	6.25 to 6.75
Stove plate (foundry)	4.75 to 5.50
Malleable cast (railroad)	6.50 to 7.00
Cast borings (chemical)	8.00 to 8.50

Prices per gross ton, deliv'd local foundries:

No. 1 machinery cast	$9.50 to $10.00
No. 1 hvy. cast (columns, bldg. materials, etc.; cupola size)	7.50 to 8.00
No. 2 cast (radiators, cast boilers, etc.)	6.50 to 7.00

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Hot-rolled sheets (No. 10)	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

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Inland Steel Co., Chicago, is now in production on the new four-way floor plate. The pattern of the new plate consists of short lineal projections arranged alternately at right angles to each other. This pattern, it is stated, permits less weight per square foot without loss of strength because there is less weight in the projections. It is non-skid regardless of the direction of traffic. Individual plates can be laid in any relation to each other without altering the design.

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Farrel-Birmingham Co., Inc., Ansonia, Conn., has opened a new office at 1059 First National Bank Building, Chicago, in charge of Harry Temporal, formerly of the company's Akron, Ohio, office. The Akron office, in charge of Andrew Hale, has been removed to 2710 Central Depositors Bank Building.

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Debevoise-Anderson Co., 117 Liberty Street, New York, has been appointed sales agent for Swede pig iron of the Alan Wood Steel Co., succeeding Park & Williams, Real Estate Trust Building, Philadelphia.

PHILADELPHIA Operating Rates Off—Pig Iron and Steel Buying Small

PHILADELPHIA, Sept. 22.—The average rate of steel operations is off slightly from a week ago, with some mills at about 25 per cent. Inquiry has improved somewhat, but the volume of new business is still as small as at any time this year. Prices, however, are generally maintained, mills showing no inclination to grant concessions on the current small tonnages.

There has been no increase in the volume of new structural steel projects. Pending industrial construction includes a mill building at Lansdale, Pa., for the Interstate Hosiery Co. The low bidder for 11 destroyers inquired for by the Navy Department is the Bath Iron Works, Bath, Me. Among eastern Pennsylvania shipyards, the Pusey & Jones Co., Wilmington, Del., was fourth on only one vessel and the New York Shipbuilding Corpn., Camden, was fifth from low.

PIG IRON

Foundry iron sales are still limited to small lots, on which $16 a ton, furnace, is the usual quotation, concessions from this level appearing only on the larger tonnages. Consumers in this district are maintaining the operating rates of previous weeks, usually not exceeding three or four days a week. While consumers are steady buyers of carload lots of foundry iron, there is no inclination to cover forward requirements. Basic pig iron is still quiet, with users covered at present operating rates.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$16.26 to $16.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	16.76 to 17.26
East. Pa. No. 1X	17.26 to 17.76
Basic (del'd east. Pa.)	16.75
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east, Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.04
Va. No. 2, 2.25 to 2.75 sil.	22.54

Prices, except as specified otherwise are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

STEEL BARS

Buying is small. The price is unchanged at 1.60c., Pittsburgh, or 1.89c., delivered Philadelphia. Billet steel reinforcing bars are quoted at 1.60c., Pittsburgh, or 1.89c., Philadelphia, with concessions of $1 and more a ton on sizable projects. Foreign reinforcing bars have been offered in this district at 1.45c. to 1.50c. a lb., delivered, but few tonnages have been sold by importers at these prices. Rail steel bars range from 1.20c. to 1.30c., Pittsburgh, or 1.49c. to 1.59c., Philadelphia. One of the largest recent awards of bars is 800 tons for a school at Fifty-ninth and Malvern Streets, Philadelphia, placed with the Concrete Steel Co.

SHAPES

Prices are generally unchanged at 1.70c., f.o.b. nearest mill to consumer, or 1.76c., delivered Philadelphia, with concessions to 1.65c., mill, or 1.71c., Philadelphia, on the more desirable specifications. Structural mills are operating at a slightly better rate than plate producers, but are in most cases under 30 per cent of capacity.

PLATES

Orders are generally small, but prices are firm at 1.70c., f.o.b. Coatesville, Pa., or 1.80½c., delivered Philadelphia. New projects require only small tonnages of plates, so that the aggregate of business coming to mill books is decidedly small.

SHEETS

Radio manufacturers are continuing to operate at the rates which have prevailed in recent weeks, but are buying only for immediate needs, in most cases having no definite fall production schedules. Other consumers in this district are maintaining the operating rates which have prevailed over the past two months and longer. Sheet prices are firm, despite efforts by buyers to obtain concessions.

IMPORTS

In the week ended Sept. 19, 3516 tons of pig iron arrived at this port, of which 3491 tons was from British India and 25 tons from Sweden. Iron ore arrivals consisted of 304 tons from Spain. Steel imports were 143 tons of structural shapes from France and 27 tons from Belgium, 17 tons of steel hoops from England, 20 tons of steel bars from Belgium and 20 tons of iron bands and 27 tons of shapes from Germany.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform	2.30c.
Cold-fin. steel, rounds and hex	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¼-in. inclu.	2.90c.
Spring steel	5.00c.
Hot-rolled, box annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	4.00c.
Hot rolled blue annealed sheets (No. 10)	3.65c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

OLD MATERIAL

All grades of scrap are inactive. Shipments of No. 1 heavy melting steel are still going forward to the consumer at Coatesville, Pa., and heavy breakable cast scrap is being shipped to Coatesville and Phoenixville, Pa., and Florence, N. J. Although sellers are now willing to accept $10 a ton for heavy breakable cast, buyers are unwilling to pay more than $9.50 a ton, delivered. The consumer at Phoenixville is still delaying deliveries of machine shop turnings and No. 2 steel on contracts.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$8.00 to $9.00
No. 2 heavy melting steel	7.00
No. 1 railroad wrought	10.00 to 10.50
Bundled sheets (for steel works)	6.50
Hydraulic compressed, new	7.00 to 7.50
Hydraulic compressed, old	6.00 to 6.50
Machine shop turnings (for steel works)	5.50 to 6.00
Heavy axle turnings (or equiv.)	8.00 to 8.50
Cast borings (for steel works and roll. mill)	5.50 to 6.00
Heavy breakable cast (for steel works)	10.00
Railroad grate bars	7.50 to 7.75
Stove plate (for steel works)	7.50 to 7.75
No. 1 low phos., hvy. (0.04% and under)	12.00 to 13.00
Couplers and knuckles	11.00
Rolled steel wheels	11.00
No. 1 blast furnace	5.50
Wrot. iron and soft steel pipe and tubes (new specific.)	10.50 to 11.00
Shafting	15.00 to 15.50
Steel axles	16.00 to 16.50
No. 1 forge fire	7.50 to 8.00
Cast iron carwheels	12.00 to 12.50
No. 1 cast	11.00 to 11.50
Cast borings (for chem. plant)	11.50 to 12.00
Steel rails for rolling	10.50

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Canadian Imports of Galvanized Sheets Drop

Production of galvanized sheets in Canada during the first six months of 1931 totaled 24,967 tons, according to the Dominion Bureau of Statistics. Imports of galvanized flat sheets during the same period amounted to 9369 tons, of which 4938 tons came from Great Britain, 4342 tons from the United States, and only 89 tons from other countries. These figures show a considerable drop in imports. Imports during the first six months of 1930 totaled 19,044 tons, of which the United States furnished 12,984 tons and Great Britain 5980 tons. The 1930 output in Canada was 52,873 tons.

There are five makers of galvanized sheets in Canada as follows: Baldwin's Montreal, Ltd., Montreal; Canadian Steel Corpn., Ltd., Ojibway, Ont.; Dominion Alloy Steel Corpn., Ltd., Sarnia, Ont.; Lysaght Dominion Sheet Metal Corpn., Ltd., Hamilton, Ont.; Steel Co. of Canada, Ltd., Hamilton.

CINCINNATI

Slight Gain Occurs in Orders for Sheet Steel—Pig Iron Dull

CINCINNATI, Sept. 22.—The district pig iron market is unimpressive. Consumers are loath to anticipate their needs beyond current requirements. Sales last week totaled about 1030 tons, all in small quantities. Foundries are without appreciable business and are running only a few small heats each week. Shipments of pig iron on old contracts continue to move at fair rate. In fact, only a few melters have held up the movement of material this month. Prices on Northern iron continue to be uncertain, while Southern prices are steady. A recent inquiry for 750 to 1000 tons of Northern or Southern iron from an Indiana melter remains open. There are no other substantial inquiries before the trade.

Prices per gross ton, deliv'd Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$14.69
Ala. fdy., sil. 2.25 to 2.75	15.19
Tenn. fdy., sil. 1.75 to 2.25	14.69
S'th'n Ohio silvery, 8 per cent	23.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

FINISHED STEEL

Demand for sheets last week was better than at any time during the past six weeks. The increased bookings, however, were only slightly above the six weeks' average. Sheet users are not anticipating their needs, but are content to order as the requirement is found. Operations are at about 40 per cent.

OLD MATERIAL

Movement of scrap on contract is slow, while new business is infrequent. Dealers' bids are nominal.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex	3.50c.
Squares	4.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00
Lap-welded steel boiler tubes, 2-in.	16.50
4-in.	34.50

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$7.00 to	$7.50
Scrap rails for melting	9.00 to	9.50
Loose sheet clippings	3.50 to	4.00
Bundled sheets	6.00 to	6.50
Cast iron borings	3.75 to	4.25
Machine shop turnings	4.00 to	4.50
No. 1 busheling	5.50 to	6.00
No. 2 busheling	3.50 to	4.00
Rails for rolling	9.50 to	10.00
No. 1 locomotive tires	9.00 to	9.50
No. 2 railroad wrought	7.00 to	7.50
Short rails	12.50 to	13.00
Cast iron carwheels	9.00 to	9.50
No. 1 machinery cast	10.50 to	11.00
No. 1 railroad cast	9.50 to	10.00
Burnt cast	4.25 to	4.75
Stove plate	4.25 to	4.75
Brake shoes	4.25 to	4.75
Agricultural malleable	8.00 to	8.50
Railroad malleable	9.00 to	9.50

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BOSTON

Business in Pig Iron, Scrap and Steel Mill Products Is Dull

BOSTON, Sept. 22.—Pig iron sales the past week again fell considerably short of 1000 tons. Although industrial conditions in Connecticut are improving, the outlook for pig iron buying is uncertain because New England foundries in general, instead of increasing their melt, are slipping in output. Despite the lack of business, however, furnaces are obtaining slightly better prices on tonnages placed without competition.

Foundry iron prices per gross ton deliv'd to most New England points:

•Buffalo, sil. 1.75 to 2.25	$19.91
•Buffalo, sil. 2.25 to 2.75	19.91
†Buffalo, sil. 1.75 to 2.25	19.28
†Buffalo, sil. 2.25 to 2.75	19.28
•Ala., sil. 1.75 to 2.25	$20.11 to 20.61
•Ala., sil. 2.25 to 2.75	20.61 to 21.11
†Ala., sil. 1.75 to 2.25	16.75
†Ala., sil. 2.25 to 2.75	17.25

Freight rates: $4.91 all rail and $4.28 rail and water from Buffalo; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.
•All rail rate.
†Rail and water rate.

CAST IRON PIPE

The Donaldson Iron Co. took the only two round tonnages placed the past week, 400 tons of 16-in. for Beverly, Mass., and 110 tons of 6 and 8-in. for Natick, Mass. Hartford, Conn., closed bids yesterday on 550 tons of 12 to 16-in. pipe, and will make an award this week. The Universal interest sold 500 tons of 12-in. pipe to Phoenix, N. Y. The Warren Pipe Co. of New England bookings the past week were confined to carlots. That foundry is booked two months ahead. Pipe prices are still elastic, but are so near production costs, spreads between bids for contracts are growing smaller.

OLD MATERIAL

Prices of some grades now vary quite a little because a few brokers still have orders to fill, while others have none and have dropped their offers. Steel turnings are a case in point. One Pennsylvania consumer is holding up contract shipments, and brokers having these contracts can pay up to $2.10 a ton, on cars shipping point. Brokers having no contracts will not pay more than $1.25 a ton. Brokers can dispose of No. 1 heavy melting steel for Pennsylvania delivery at $4.10 a ton, on cars, and for Worcester, Mass., delivery, at $4.60 a ton. There is a market for chemical borings, but few are available. For textile and No. 1 machinery cast, Pennsylvania delivery, $5.50 to $5.60 a ton, on cars, is offered. For motor blocks, $3.25 to $3.50 a ton, on cars, appears to be the market. Quotations on railroad wrought, railroad malleable, shafting and axles are unobtainable, there being no demand for these materials. Shipments of all materials continued light the past week. The Boston Iron & Metal Co., Baltimore, has purchased and will junk the Boston - Yarmouth steamer Prince George.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$4.10 to	$4.60
Scrap T rails	4.10 to	4.60
Scrap girder rails	3.10 to	3.60
No. 1 railroad wrought	7.00 to	7.50
Machine shop turnings	1.25 to	2.10
Cast iron borings (steel works and rolling mill)	1.50 to	1.75
Bundled skeleton, long	3.00 to	3.25
Forge flashings	3.00 to	3.50
Blast furnace borings and turnings	0.85 to	1.25
Forge scrap	2.00 to	2.50
Shafting	10.00 to	10.50
Steel car axles	11.00 to	12.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	4.00 to	4.25
Rails for rolling	7.50 to	8.00
Cast iron borings, chemical	7.00 to	7.25
No. 2 cast	4.85 to	5.00

Prices per gross ton deliv'd consumers' yards:

Textile cast	$9.50 to	$10.00
No. 1 machinery cast	9.50 to	10.00
Stove plate	5.00 to	5.25
Railroad malleable	13.00 to	13.50

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Robbins & Myers, Inc., hoist and crane division, Springfield, Ohio, has appointed W. P. & R. S. Mars Co., Duluth, Minn., as exclusive sales representative for Robbins & Myers hand and electric hoists, cranes and trolleys in northern Minnesota and upper Michigan.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	•3.35c.
Structural shapes—	
Angles and beams	•3.35c.
Tees	•3.35c.
Zees	•3.35c.
Soft steel bars, small shapes	•3.25c.
Reinforcing bars	3.10c. to 3.25c.
Iron bars—	
Refined	3.25c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	•3.75c. to 4.25c.
Hoop steel	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.80c.
	Per Cent Off List
Machine bolts	65 and 5
Carriage bolts	65 and 5
Lag screws	65 and 5
Hot-pressed nuts	40 and 10
Cold-punched nuts	40 and 10
Stove bolts	70 and 10

•Base price (250 to 999 lb.): less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

BIRMINGHAM

Pig Iron Production Being Restricted—Steel Demands Gain Slightly

BIRMINGHAM, Sept. 22.—With the outlook still unimproved and current tonnage sluggish and irregular, pig iron producers in the Birmingham district are taking further steps to keep output within the range of current shipments. One company, while continuing to operate two furnaces, has restricted production considerably during the past two months. This month another company has adopted such a policy and its output will probably not be more than 60 per cent of normal. Other changes are pending. Even with the blowing out of four stacks during the past two months, output has continued to exceed shipments and yard stocks have grown. Eight furnaces are still in blast, seven on foundry iron and one on basic. District sales remain on a $12 base.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50
Basic	12.00

FINISHED STEEL

Both of the manufacturers of steel in this district report that bookings last week were slightly improved and were above the average for the preceding three or four weeks. Contract tonnage for the fourth quarter is beginning to appear, and prospects for seasonal improvement are fairly encouraging. Manufacturers of wire products are looking for a moderate advance from the low summer levels. Fabricators have very little to report, although last week brought several orders above the ordinary run. Dudley Bar Co. has secured 3000 tons of bars for the Harvey Canal lock, opposite New Orleans. Nashville Bridge Co. booked 3000 tons of structural steel for a State highway bridge at Krotz Springs, La. Other orders of the week were small. Quotations are unchanged. Open-hearth operations continue at nine, six being operated at Fairfield by the Tennessee company and three at Alabama City by the Gulf States Steel Co.

CAST IRON PIPE

As the active pipe buying season draws to a close, new tonnage is growing smaller. Bookings of last week were more restricted. Local plants still hope for additional business from the Midwest and North before winter closes in, but prospects on the whole are rather slim. Operations are becoming more irregular and probably average now around 40 per cent. One plant will probably be down the whole of the present week. Others are also running on intermittent schedules.

OLD MATERIAL

The market has been more or less at a standstill, with few sales or inquiries. Contract shipments have been suspended or held to a minimum by a number of the mills. No changes have been made in prices.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$8.50 to	$9.00
Scrap steel rails		8.50
Short shoveling turnings		6.50
Cast iron borings	(No market)	
Stove plate		7.00
Steel axles	15.00 to	16.00
Iron axles		18.00
No. 1 railroad wrought		8.00
Rails for rolling	11.50 to	12.00
No. 1 cast		9.00
Tramcar wheels	10.00 to	10.25
Cast iron borings, chem.		13.50

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BUFFALO

Leading Consumer Buys Scrap—Steel Plant Operations Unchanged

BUFFALO, Sept. 22.—The pig iron market shows few signs of activity. Sales and shipments are running about even, with sales confined to small lots. No large inquiries are out, although producers are being called upon by some of the larger melters for quotations on tentative future business. Most of the barge iron for storage has been shipped. Prices are unchanged. Two furnace interests are adhering strictly to a $16 base on Eastern business. However, less than this can be done on Buffalo iron for outside shipment.

Prices per gross ton f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$17.00
No. 2X fdy., sil. 2.25 to 2.75	17.50
No. 1 fdy., sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	25.28

FINISHED STEEL

Operations in the Buffalo district remain about the same. The Lackawanna plant of the Bethlehem Steel Co. is operating nine open-hearths this week.

Republic Steel has resumed operation with three open-hearths. Wickwire Spencer has two open-hearths in service.

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex	3.15c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.45
Black wire, base per 100 lb.	3.20

OLD MATERIAL

The leading consumer of the district has purchased a quantity of No. 1 heavy melting steel and a lesser quantity of No. 2 heavy melting steel. It is understood that the total was between 4000 and 5000 tons. Prices were $9 for No. 1 and $7.50 for No. 2. It is also reported that the same concern made a purchase of No. 1 heavy melting steel direct from a railroad at $9.50. Some sales of machine shop turnings have been made at $6.25, Niagara Falls. The supply of machine shop turnings is small, as some of the surrounding districts which would ordinarily ship to Buffalo are shipping to Youngstown.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	$9.00 to	$9.50
No. 2 heavy melting scrap	7.50 to	8.00
Scrap rails	9.50 to	10.00
Hydraul. comp. sheets		7.50
No. 2 hydraul. comp. sheets		7.00
Hand bundled sheets		7.00
Drop forge flashings		7.50
No. 1 busheling	7.50 to	8.00
Hvy. steel axle turnings	8.00 to	8.50
Machine shop turnings	4.50 to	5.00
No. 1 railroad wrought	7.50 to	8.00
Acid Open-Hearth Grades:		
Knuckles and couplers	10.50 to	11.00
Coil and leaf springs	10.50 to	11.00
Rolled steel wheels	10.50 to	11.00
Low phos. billet and bloom ends	12.50 to	13.00
Electric Furnace Grades:		
Short shov. steel turnings	6.50 to	7.00
Blast Furnace Grades:		
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings	6.00 to	6.50
No. 2 busheling	4.50 to	5.00
Rolling Mill Grades:		
Steel car axles	15.00 to	15.50
Iron axles	16.00 to	16.50
Cupola Grades:		
No. 1 machinery cast	10.00 to	10.50
Stove plate	8.25 to	8.50
Locomotive grate bars	7.00 to	7.50
Steel rails, 3 ft. and under	12.00 to	12.50
Cast iron carwheels	10.50 to	11.00
Malleable Grades:		
Industrial	10.00 to	10.50
Railroad	10.00 to	10.50
Agricultural	10.00 to	10.50
Special Grades:		
Chemical borings	9.00 to	9.50

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Canada

Moderate Improvement in Sales of Pig Iron

TORONTO, Sept. 21.—The Canadian pig iron market has experienced increased activity in the past week or 10 days. Indications of important improvement in the remainder of the year, however, are lacking. Much of the current demand comes from cast iron and steel pipe makers, while specifications from other quarters are light. No sizable orders were reported for the week. Sales of basic iron are intermittent and usually command price concessions. Pig iron production in Canada is estimated at about 32 per cent of capacity. A typographical error has been appearing in the quotations on basic pig iron

at Montreal. The corrected quotations are $23 to $23.50.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

OLD MATERIAL

New business in this market is limited. Mills are taking small quantities of heavy melting steel and turnings, with shipments into the Hamilton district generally restricted. Low consumer stocks of No. 1 machinery cast created some demand for this grade, while sales of stove plate and malleable scrap are reported to be improved. Dealers are out of the market for scrap, and prices are unchanged.

Dealers' buying prices for old material:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	....	10.00
Stove plate	....	8.00
Standard carwheels	....	8.50
Malleable	....	8.00
Per Net Ton		
No. 1 machinery cast	11.00	....
Stove plate	9.00	....
Standard carwheels	10.00	....
Malleable scrap	9.00	....

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ST. LOUIS

Stove Manufacturers Fairly Busy—One Inquires for 1000 Tons of Pig Iron

ST. LOUIS, Sept. 22.—A leading stove manufacturer in the St. Louis industrial district is in the market for 1000 tons of either Northern or Southern pig iron for delivery over the remainder of the year. First shipments of stoves for the season are said to have been better than expected and plant operations have improved, the future depending, of course, upon the weather. Implement manufacturers have virtually ceased operations, not to resume until about Nov. 15. Stocks of iron in hands of the local maker are not increasing. The market continues firm at unchanged prices.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25 f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	15.42
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

FINISHED STEEL

While the volume of current business is somewhat less than a month ago, the Granite City Steel Co. reports that sheet prices appear to be very firm. The demand for plates is quite light. As is natural at this time of year, the demand for tin plate has fallen off considerably, and no great amount of business is expected until after the turn of the year.

The Terminal Railroad Association of St. Louis has awarded 2500 tons of structural steel to the Mississippi Valley Structural Steel Co. for overhead crossings at East St. Louis.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
	Per Cent Off List
Tank rivets, ⅞-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60

OLD MATERIAL

The scrap market for old material is virtually at a standstill. Mills in the district have given little relief from the embargo on shipments against contracts and show no disposition to place new business. This has resulted in a shutdown of yards by dealers, some of whom have not been bidding on railroads' lists of scrap iron. Prices are nominally unchanged.

Railroad lists: International Great Northern, 3900 tons; Alton Railroad, 1100 tons; Chicago, Milwaukee, St. Paul & Pacific, 60 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	$7.75 to $8.25
No. 1 heavy melting or shoveling steel	7.50 to 8.00
No. 2 heavy melting or shoveling steel	7.00 to 7.50
No. 1 locomotive tires	9.00 to 9.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	8.50 to 9.00
Railroad springs	8.75 to 9.25
Bundled sheets	5.00 to 5.50
No. 2 railroad wrought	7.50 to 8.00
No. 1 busheling	6.25 to 6.75
Cast iron borings and shoveling turnings	5.25 to 5.75
Iron rails	7.00 to 8.00
Rails for rolling	10.50 to 11.00
Machine shop turnings	3.00 to 3.50
Heavy turnings	6.00 to 6.50
Steel car axles	11.50 to 12.00
Iron car axles	15.00 to 15.50
Wrot. iron bars and trans.	6.00 to 6.50
No. 1 railroad wrought	5.00 to 5.50
Steel rails, less than 3 ft.	11.00 to 11.50
Steel angle bars	7.50 to 8.00
Cast iron carwheels	6.75 to 7.25
No. 1 machinery cast	8.00 to 8.50
Railroad malleable	6.50 to 7.00
No. 1 railroad cast	7.50 to 8.00
Stove plate	7.00 to 7.50
Relay. rails, 60 lb. and under	16.00 to 16.50
Relay. rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	6.50 to 7.00

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PACIFIC COAST

Price Weakness Affects Most Products Except Sheets—Business Sluggish

SAN FRANCISCO, Sept. 21.—Hungry for orders, mills, fabricators and warehouse men in the Far West are bidding lower for large business, with a disturbing effect on an already weak market. The single exception seems to be steel sheets, which continue without noticeable deviation from the schedule of July 1.

Federal, State and municipal specifications continue to make up a large share of the larger awards and inquiries, yet many of these major projects are so slow in getting approved and out for figures that their effect is almost unnoticed. In general, no change in trend within the last month can be definitely noted.

BARS

Open lettings on major contracts for the week total 775 tons, with 950 tons of new inquiries entered. During the coming week the State of California will open bids for highway construction in various districts, requiring a total of 1360 tons of reinforcing steel.

PLATES

Inquiries for only 335 tons are entered for major projects, with no important letting reported. It is significant that eight projects for water supplies and reclamation involve a total expenditure of $10,490,000, most of which will go for pipe. Prices remain weak.

CAST IRON PIPE

Awards reported total 434 tons, with 1850 tons of new business, including

F.O.B. Warehouse Prices

(Less than 5000 Lb.)

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates and struc. shapes, ¼-in. and heavier	2.80c.	3.00c.	2.25c.
Soft steel bars	2.80c.	3.00c.	2.25c.
Reinforcing bars	2.80c.	2.80c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.90c.	4.00c.	3.50c.
Hot-rolled sheets (No. 10)	3.40c.	3.50c.	3.00c.
Galv. sheets (No. 24)	4.40c.	4.20c.	4.00c.
Struc. rivets, ½ in. and larger, less than 1000 lb.	5.00c.	5.00c.	5.50c.
Special nails: common 4 to 60d; smooth box 4 to 20d; finish 6 and 8d; base per keg	$2.55	$2.45	$2.40
Other wire nails, base per keg	2.80	2.70	2.65
Cement c't'd nails, 100-lb. keg	2.65	2.70	2.65

1050 tons for Salt Lake City. American Cast Iron Pipe Co. was low on 334 tons for Fresno, Cal. Vancouver, B. C., has called for bids on 660 tons of 4 to 8-in. Class 150. Large lettings are practically at pre-war prices.

SHAPES

Awards of 1060 tons are reported, with new projects calling for a total of 1140 tons, and with important lettings, especially for Federal buildings, delayed beyond expectations. The test suit on the validity of bonds for the Golden Gate bridge was heard before the Supreme Court of California on Sept. 15, but no decision has been announced, and contracts for steel are inoperative until the securities have been approved.

STEEL PIPE

Santa Barbara, Cal., is voting on bonds for $300,000 for water works improvements and included is over $100,000 for replacements and extension of distributing mains. San Diego has authorized the preparation of plans for an 8-mile pipe line to cost about $465,000.

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FABRICATED STRUCTURAL STEEL

New Projects of 40,000 Tons Include 15,000-Ton Detroit Post Office—Awards Only 12,000 Tons

NEW fabricated steel projects of 40,000 tons compare with 37,000 tons a week ago and 20,000 tons two weeks ago. Included are 15,000 tons for a post office in Detroit, 5000 tons for an auditorium in Grand Rapids, Mich., 5000 tons for a prison at Milan, Mich., and 1600 tons for caissons on the New Orleans Belt Line railroad bridge.

Awards of only 12,000 tons are the smallest reported for any week since Feb. 12, and compare with 30,000 tons a week ago. Included are 1300 tons in a home economics building at Cornell University, 2500 tons for an overhead crossing in East St. Louis, Ill., for the Terminal Railroad Association of St. Louis, and 1200 tons for a bridge on the New York Central Railroad at South Bend, Ind. Awards follow:

North Atlantic States

MILFORD, CONN., 145 tons, highway bridge, to McClintic-Marshall Corpn.

NEW HAVEN, CONN., 275 tons, Ray Tompkins House, Yale University, to Bethlehem Fabricators, Inc.

NEW YORK, 545 tons, building for Manufacturers' Trust Co., to Ingalls Iron Works.

SUFFOLK COUNTY, N. Y., 7000 tons, bridges from Shelter Island to Greenport, to John A. Roebling's Sons Co., fabrication by Independent Bridge Co., Pittsburgh.

ITHACA, N. Y., 1300 tons, Home Economics Building, Cornell University, to Bethlehem Fabricators, Inc.

STATE OF NEW YORK, 250 tons, highway bridge, to American Bridge Co.

TRENTON, N. J., 1200 tons, Post Office, to American Bridge Co.

BALTIMORE, 400 tons, store for Hutzler Brothers, to Dietrich Brothers.

The South

STAUNTON, VA., 200 tons, gymnasium, to Bethlehem Construction Co.

Central States

NEW YORK CENTRAL RAILROAD, 1200 tons, bridge over Walnut Street in South Bend, Ind., to unnamed fabricator.

PERE MARQUETTE RAILROAD, 300 tons, grade separation at Wayne, Mich., to American Bridge Co.

CHICAGO, 230 tons, Sidney Wanzer & Sons, to Vierling Steel Works.

CHICAGO, 500 tons, Firestone Tire & Rubber Co., to Austin Co.

CHICAGO, 100 tons, hangar at municipal airport, to Wendnagel & Co.

CHICAGO, 350 tons, pump house for sanitary district, to McClintic-Marshall Corpn.

CHICAGO, 100 tons, Central Wholesale Groceries warehouse, to Mississippi Valley Structural Steel Co.

ALTON, ILL., 350 tons, Principia College, to Mississippi Valley Structural Steel Co.

MILWAUKEE, 125 tons, Matthew Keenan Health Center, to C. Hennecke Co., Milwaukee.

SANGAMON COUNTY, ILL., 955 tons, bridges, to Clinton Bridge Co.

EAST ST. LOUIS, ILL., 2500 tons, overhead crossings for Terminal Railroad Association of St. Louis, to Mississippi Valley Structural Steel Co.

TOPEKA, KAN., 250 tons, National Bank building, to Kansas City Structural Co.

Western States

UMATILLA COUNTY, ORE., 175 tons, two bridges for Federal Bureau of Public Roads on John Day Highway, to Union Bridge Co., Portland.

SUNNYVALE, CAL., 300 tons, mooring mast at army dirigible base, to Wellman Engineering Co.

SAN FRANCISCO, 460 tons, telephone exchange building, to Judson-Pacific Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

WHITMAN, MASS., 230 tons, manufacturing plant.

PAWTUCKET, R. I., 450 tons, Post Office; general contract awarded to Edward S. Moore & Son, Kokomo, Ind.

STATE OF MASSACHUSETTS, 820 tons, highway bridge between Millbury and Worcester.

SUSSEX, N. J., 300 tons, high school for Borough of Sussex.

ITHACA, N. Y., 500 tons, agricultural economics building for Cornell University.

NEW YORK CENTRAL RAILROAD, 7500 tons, overhead viaduct from Eighteenth to Thirtieth Streets; former bids rejected, new bids open Sept. 29.

COMSTOCK, N. Y., 100 tons, shop buildings at Great Meadow Prison.

STATE OF NEW YORK, 130 tons, highway bridge, R. C. 2160, in Shenango County; general contract awarded.

BRENTWOOD, N. Y., 200 tons, trestle for Pilgrim State Hospital.

CAMDEN, N. J., 500 tons, hospital for mentally deficient.

STATE OF NEW JERSEY, 275 tons, viaduct over Lehigh Valley Railroad and Liberty Avenue, Hillside; bids open Oct. 7.

PHILADELPHIA, 200 tons, bridge at Summerdale Avenue for Reading Co.

LANSDALE, PA., 100 tons, mill building for Interstate Hosiery Co.

WASHINGTON, 14,000 tons, United States Supreme Court building; bids open Oct. 21 by Architect of Capitol.

WASHINGTON, 800 tons, Senate office building; George A. Fuller Co. low for general contract.

The South

JACKSONVILLE, FLA., 550 tons, Parcel Post building; bids open Oct. 15.

MIAMI, FLA., 2000 tons, Post Office, Court House and Customs House; Ralph Sollitt & Sons, Chicago, low bidder for general contract.

NEW ORLEANS, 58,000 tons, bridge across Mississippi River, for New Orleans Public Belt Railway; low bidders: McClintic-Marshall Corpn., 37,000 tons for approaches; American Bridge Co., 21,000 tons for superstructure.

NEW ORLEANS, 1600 tons, caissons for New Orleans Belt Line Bridge.

AUSTIN, TEX., 1000 tons, University of Texas.

TEXARKANA, TEX., 900 tons, Post Office.

Central States

DETROIT, 15,000 tons, Post Office.

GRAND RAPIDS, MICH., 5000 tons, auditorium.

MILAN, MICH., 5000 tons, prison.

NILES, OHIO, 130 tons, Post Office; bids open Oct. 15.

MISSOURI PACIFIC RAILROAD, 500 tons, bridge.

STATE OF ILLINOIS, 1400 tons, bridges, Clinton Bridge Co., low bidder.

CHICAGO, 2200 tons, two public schools.

ELMHURST, ILL., 450 tons, grade separation; Arcole Construction Co., Niles Center, Ill., general contractor.

ST. LOUIS, 500 tons, bridge.

Western States

HELENA, MONT., 300 tons, Federal office building; supplementary bids open Sept. 30.

HANAFER, UTAH, 128 tons, two highway bridges.

FRESNO, CAL., 155 tons, Belmont Avenue subway.

SAN JOSE, CAL., 260 tons, Southern Pacific grade crossing.

SAN JOSE, 200 tons, County Court House.

LAS VEGAS, NEV., 400 tons, hotel.

FABRICATED PLATES

BURLINGTON, N. J., 275 tons, tanks for Standard Oil Co. of New Jersey, to McClintic-Marshall Corpn.

DALLAS, TEX., 600 tons, tanks for Burford Oil Co., to Chicago Bridge & Iron Co.

PITTSBURGH, 180 tons, barge for Atlantic Refining Co., to McClintic-Marshall Corpn.

MEMPHIS, TENN., 240 tons, pontoons and dredge pipe for United States Engineers, to St. Louis Structural Steel Co.

MISSISSIPPI VALLEY BARGE LINE may purchase 10 to 40 steel barges.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$29.00
Rerolling, 4-in. and under 10-in., Youngstown	29.00
Rerolling, 4-in. and under 10-in., Cleveland	29.00
Rerolling, 4-in. and under 10-in., Chicago	31.00
Forging quality, Pittsburgh	35.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$29.00
Youngstown	29.00
Cleveland	29.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$29.00
Youngstown	29.00
Cleveland	29.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

PRICES OF RAW MATERIAL

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron, dry, Spanish or Algerian	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Iron ore, basic and foundry, Russian, average 63% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	$12.00 to $12.50
	Per Gross Ton
Chrome ore, 45% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$20.00
Chrome ore, 48% Cr_2O_3, c.i.f. Atlantic seaboard	22.50

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.40
Foundry, f.o.b. Connellsville prompt	$3.25 to 4.50
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, ¾-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.60 to .75
Gas slack, f.o.b. W. Pa. mines	.60 to .75

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	*$80.00 to $85.00
Foreign, 80%, Atlantic or gulf port, duty paid	*80.00 to 85.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$28.00 to $30.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

Per Gross Ton Furnace		Per Gross Ton Furnace	
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	31.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio Furnace

Per Gross Ton		Per Gross Ton	
10%	$25.00	13%	$29.00
11%	26.00	14%	31.00
12%	27.00	15%	33.00

Silvery Iron

F.o.b. Jackson County, Ohio Furnace

Per Gross Ton		Per Gross Ton	
6%	$20.00	11%	$23.00
7%	20.50	12%	24.00
8%	21.00	13%	26.00
9%	21.50	14%	28.00
10%	22.00	15%	30.00

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd, carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	24.50c. to 26.00c.
Ferrochromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. contained Mo., delivered	1.00
Calcium molybdate, per lb. contained Mo., delivered	85c.
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	$5 a ton higher

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$13.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.00

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$40.00	$32.00 to $35.00
Maryland	40.00	32.00 to 35.00
New Jersey	44.00 to 59.00	.....
Ohio	40.00	32.00 to 35.00
Kentucky	40.00	32.00 to 35.00
Missouri	37.00	32.00 to 35.00
Illinois	40.00	32.00 to 35.00
Ground fire clay, per ton	6.50	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$40.00
Chicago	49.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	73 and 10
†Carriage bolts	73 and 10
Lag bolts	73 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	73 and 10
Hot-pressed nuts, blank or tapped, square	73 and 10
Hot-pressed nuts, blank or tapped, hexagons	73 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	73 and 10
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	73 and 10
Semi-finished hexagons castellated nuts, S.A.E.	73 and 10
Stove bolts in packages, 1"gh.	80, 10, 10, 10 and 5
Stove bolts in packages, Ch'go.	80, 10, 10, 10 and 5
Stove bolts in pkgs., Cleveland.	80, 10, 10, 10 and 5
Stove bolts in bulk, P'gh.	80, 10, 10, 10, 5 and 2½
Stove bolts in bulk, Ch'go.	80, 10, 10, 10, 5 and 2½
Stove bolts in bulk, Cleveland,	80, 10, 10, 10, 5 and 2½
Tire bolts	60, 10 and 10

Discounts of 73 and 10 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.50
F.o.b. Chicago	2.60

Small Rivets

(⅞-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.89c.
Del'd New York	1.93c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.70c.
C.i.f. Pacific ports	2.00c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.55c. to 1.60c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mill	1.60c.
Del'd Philadelphia	1.49c. to 1.59c.

Iron

Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
Del'd Cleveland	1.78½c.
Del'd Philadelphia	1.80½c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
F.o.b. Lackawanna	1.70c.
Del'd New York	1.88c.
C.i.f. Pacific ports	1.85c. to 1.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.78½c.
Del'd Philadelphia	1.71c. to 1.76c.
Del'd New York	1.85½c.
C.i.f. Pacific ports	2.05c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh	1.65c.
Wider than 6 in., P'gh	1.55c.
6 in. and narrower, Chicago	1.75c.
Wider than 6 in., Chicago	1.65c.
Cooperage stock, P'gh	1.75c. to 1.85c.
Cooperage stock, Chicago	1.85c. to 1.95c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	*2.45c. to 3.40c.
Strips, P'gh	2.15c. to 2.25c.
Strips, Cleveland	2.15c. to 2.25c.
Strips, deliv'd Chicago	2.43c. to 2.53c.
Strips, Worcester	2.30c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.20c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base Per Keg
Standard wire nails	$1.90
Smooth coated nails	1.90
Galvanized nails	3.90

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.35c.
Galvanized staples	2.60c.
Barbed wire, galvanized	2.55c.
Woven wire fence, Nos. 9 and 11 gage, per net ton	$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

To Retail Trade

	Base Per Keg
Standard wire nails	$2.00
Cement coated nails	2.00
Galvanized nails	4.00

	Base per Lb.
Smooth annealed wire	2.45c.
Smooth galvanized wire	2.90c.

	Base per Lb.
Polished staples	2.45c.
Galvanized staples	2.70c.
Barbed wire, galvanized	2.65c.
Woven wire fence, Nos. 9 and 11 gage, per net ton	$60.00
Woven wire fence, 12½ gage and lighter, per net ton	65.00

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.70c.
No. 10, f.o.b. Chicago mills	1.80c.
No. 10, del'd Philadelphia	1.99c.
No. 10, f.o.b. Birmingham	1.85c.
No. 10, c.i.f. Pacific Coast ports	2.33c.

(Note: To above prices are added extras for annealing and for width over 48 in., and for less than five tons of each gage or size.)

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Chicago mills	2.50c.
No. 24, del'd Philadelphia	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, c.i.f. Pacific Coast ports	2.88c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.35c.
No. 10 gage, f.o.b. Chicago mills	2.45c.
No. 10 gage, del'd Philadelphia	2.64c.
No. 10 gage, f.o.b. Birmingham	2.50c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Chicago mills	3.05c.
No. 20 gage, del'd Philadelphia	3.24c.
No. 20, f.o.b. Birmingham	3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.10c.

Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.75c.
No. 20, f.o.b. Pittsburgh	3.35c.

(Prices on furniture stock include stretcher leveling but not resquaring).

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.90c.
No. 24, f.o.b. Chicago Mills	3.00c.
No. 24, del'd Philadelphia	3.19c.
No. 24, f.o.b. Birmingham	3.05c.
No. 24, c.i.f. Pacific Coast ports	3.38c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	3.15c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.90c.
No. 20, f.o.b. Pittsburgh	3.40c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.65c.
No. 28, Chicago mills	2.75c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$5.00
Standard cokes, f.o.b. Gary	5.10

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. $10.30	25-lb. coating I.C. $15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00	40-lb. coating I.C. 17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers		Alloy Differential
2000	(1¼% Nickel)	$0.25
2100	(1¼% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bar	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Round and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅜ in. and larger	$2.70
Spikes, ½ in. and larger	2.70
Spikes, boat and barge	2.90
Tie plate, steel	1.95
Angle bars	2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	9
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	48	26½	¼ and ⅜	+13	+48
¼ to ⅜	49	32½	½	23	7
½	55	44½	¾	28	12
¾	60	49½	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	33	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2½%, and on galvanized by 1½ points with supplementary discounts of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2 in.—2¼ in.	13
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

British Buy Metals as Sterling Declines—Tin and Copper Lower

NEW YORK, Sept. 22.

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Sept. 22	Sept. 21	Sept. 19	Sept. 18	Sept. 17	Sept. 16
Lake copper, New York	7.37½	7.37½	7.37½	7.37½	7.37½	7.37½
Electrolytic copper, N. Y.*	6.75	6.75	6.75	6.75	6.75	6.75
Straits tin, spot, N. Y.	23.37½	23.50	....	24.75	24.90	25.00
Zinc, East St. Louis	3.70	3.70	3.72½	3.72½	3.75	3.75
Zinc, New York	4.05	4.05	4.07½	4.07½	4.10	4.10
Lead, St. Louis	4.22½	4.22½	4.22½	4.22½	4.22½	4.22½
Lead, New York	4.40	4.40	4.40	4.40	4.40	4.40

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.50c. a lb., New York.

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COPPER

The price of Copper Exporters, Inc., was reduced to 7.50c. a lb., c.i.f. usual European ports, on Sept. 16, but with a further weakening in the domestic market to 7c. a lb., delivered Connecticut Valley, quoted by custom smelters, foreign sales were limited until yesterday. Following the news that Great Britain was to abandon temporarily the gold standard, commodity buying was stimulated in London, affecting most metals, especially copper. Sales abroad totaled 1150 tons on Monday and were 850 tons today, with British buyers actively converting pounds sterling into metal holdings. Total export sales to Sept. 21 are 11,600 tons.

Domestic sales have improved in the past few days, with a substantial amount of buying in the Detroit district, especially by automobile manufacturers. Recent recommendations of commodities which can be bought to advantage now have generally included copper, and sellers believe that certain consumers are buying ahead for the rest of this year as a result. Custom smelters are generally quoting 7c. a lb., delivered Connecticut Valley, but primary producers are still out of the market at present prices, except to regular customers. The market for Lake copper continues inactive, with producers maintaining 7.37½c. a lb., delivered.

TIN

Although London tin sellers advanced the market rapidly on Monday in an effort to keep prices adjusted to the rapid decrease of the pound sterling in foreign exchange, the price here declined. Spot standard tin, which was quoted at £110 17s. 6d. on Friday, Sept. 18, was advanced on Monday to £118 15s. a ton. Meanwhile the market here, which was at 24.75c. a lb. on Friday, declined on Monday's sales to 23.50c. a lb., and today to about 23.37½c., with American buyers steadily offering to buy at lowered prices and the offers being accepted. The London market today was £117 17s. 6d. a ton for spot standard, £120 10s. a ton for future standard and and £120 17s. 6d. a ton for spot Straits. The Singapore price was £122 7s. 6d. a ton. Stocks in London and Liverpool warehouses have registered a further decline of 445 tons, totaling 31,198 tons. Shipments during the week to the United States were 75 tons. Shipments from Singapore continue at a low level, with the total movement to Sept. 18 only 3831 tons.

LEAD

Commodity buying in London, as a result of the decline in the pound sterling, stimulated the lead market there, so that the price advanced 16 points to an equivalent of 4.56c. a lb., New York, temporarily at least, removing any possibility of foreign lead being sold here. Sales of lead are in good volume, with corroders, cable, tin foil and battery manufacturers buying for delivery through October. A substantial total of current business is for prompt shipment, and in certain cases consumers with contracts are specifying more than had been scheduled for shipment. In consequence, prices are firmly maintained at 4.22½c., St. Louis, and 4.40c., New York.

ZINC

The market declined 2½ points on Sept. 18, with sales by second hands at 3.72½c., East St. Louis, and registered a further decrease of 2½ points to 3.70c., East St. Louis, on Monday. While second hands are offering to sell at the lower level, there is no apparent pressure to transact business either by buyers or sellers. The former are inclined to await further possible reduction in the price and the latter believe that, with little bought for fourth quarter, some buying movement is likely to develop before long.

ANTIMONY

The Chinese metal continues to be offered for spot shipment at 6.50c. a lb., New York, but consumers show but little interest in buying. For forward delivery from China, importers believe that the price will show a slight advance as a result of the stronger silver market, but have had no occasion to test the future market, with American consumers covering only immediate needs in small lots of prompt shipment material.

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	15.00c.
*Copper, hot rolled, base sizes	16.12½c.
Seamless Tubes—	
Brass	19.75c.
Copper	19.62½c.
Brass Rods	13.25c.
Brazed Brass Tubes	23.75c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Zinc sheets, open	10.25c. to 10.50c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	26.00c. to 27.00c.
Tin, bar	28.00c. to 30.00c.
Copper, Lake	9.00c. to 10.00c.
Copper, electrolytic	8.50c. to 9.00c.
Copper, casting	8.25c. to 8.75c.
Zinc, slab	5.00c. to 5.50c.
Lead, American pig	5.25c. to 6.25c.
Lead, bar	7.00c. to 8.00c.
Antimony, Asiatic	9.50c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	20.00c. to 23.00c.
Alum. ingots, No. 12 alloy	19.00c. to 21.00c.
Babbitt metal, commercial grade	20.00c. to 20.00c.
Solder, ½ and ½	17.00c. to 18.00c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	28.50c.
Tin, bar	30.50c.
Copper, Lake	8.37½c.
Copper, electrolytic	8.37½c.
Copper, casting	8.00c.
Zinc, slab	5.25c.
Lead, American pig	5.25c.
Lead, bar	7.75c.
Antimony, Asiatic	10.00c.
Babbitt metal, medium grade	15.00c.
Babbitt metal, high grade	32.50c.
Solder, ½ and ½	19.75c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has beeen properly prepared for their uses. (All prices are nominal because of uncertain condition of market.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy crucible	5.50c.	6.25c.
Copper, hvy. and wire	5.25c.	6.00c.
Copper, light and bottoms	4.50c.	5.25c.
Brass, heavy	2.75c.	3.50c.
Brass, light	2.25c.	3.00c.
Hvy. machine composition	4.25c.	5.00c.
No. 1 yel. brass turnings	3.25c.	3.75c.
No. 1 red brass or compos. turnings	4.00c.	4.75c.
Lead, heavy	3.25c.	3.75c.
Zinc	1.50c.	2.00c.
Sheet aluminum	9.50c.	11.50c.
Cast aluminum	3.50c.	5.50c.

Reinforcing Steel

Awards and Pending Projects in Smaller Volume

LETTINGS of reinforcing steel the past week were mostly in small tonnages and totaled only 3500 tons, compared with 8350 tons in the previous week. The largest booking was 700 tons for a school in Philadelphia. About 4100 tons is added to new inquiries, which range from 100 to 700-ton jobs. Awards follow:

BOSTON, 220 tons, school, to Truscon Steel Co.

GREENFIELD, MASS., 180 tons, State highway bridge, to Kalman Steel Co.

PHILADELPHIA, 700 tons, school, to Concrete Steel Co.

INDIANAPOLIS, 100 tons, building for Sears Roebuck & Co. to Hugh J. Baker.

STATE OF NEW JERSEY, 100 tons highway bridge, route 2, section 6, to Joseph T. Ryerson & Son, Inc.

CHICAGO, 520 tons, Harlem Avenue bridge, to Concrete Engineering Co.

CHICAGO, 100 tons, warehouse for Great Atlantic & Pacific Tea Co., to Inland Steel Co.

CHICAGO, 500 tons, Sanitary District Trustees' 126th Street plant, to various bidders.

FORT WAYNE, IND., 400 tons, Post Office, to an unnamed bidder.

CEDAR RAPIDS, IOWA, 225 tons, Post Office, to Laclede Steel Co.

LOS ANGELES, 100 tons, garage for Montgomery Properties, Inc., to Schmidt Steel & Supply Co.

LOS ANGELES, 100 tons, Santa Fe Railway hospital, to Colorado Fuel & Iron Co.

WENATCHEE, WASH., 135 tons, city reservoir, to Concrete Construction Co., Seattle.

UMATILLA COUNTY, ORE., 100 tons, two bridges for Federal Bureau of Public Roads on John Day Highway, to Union Bridge Co., Portland.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

PROVIDENCE, R. I., 400 tons, State pier.

STATE OF NEW JERSEY, 257 tons, viaduct over Lehigh Valley Railroad and Liberty Avenue, route 29, Hillside; bids open Oct. 7.

STATE OF NEW JERSEY, 183 tons, bridge over Weston's Mill Road, route S28, section 1A, New Brunswick.

STATE OF NEW JERSEY, 200 tons, highway from Keyport to Keansburg.

BRENTWOOD, N. Y., 1220 tons, Pilgrim State Hospital; Brady Concrete Co., low bidder for general contract. Previously reported as 500 tons.

CHICAGO, 100 tons, Jockey Club at Hawthorne track.

CHICAGO, 350 tons, Fine Arts Building, Jackson Park.

CHICAGO, 200 tons, Central Wholesale Grocery Co.; R. Sollitt, general contractor.

CHICAGO, 225 tons, Firestone Tire & Rubber Co.

DWIGHT, ILL., 100 tons, Illinois institutional building.

MINNEAPOLIS, 700 tons, public school.

RACINE, WIS., 100 tons, Government building.

LOS ANGELES, CAL., 185 tons, flood control project; Concrete Engineering Co., low bidder.

SAN LUIS OBISPO COUNTY, CAL., 222 tons, State highway structures.

LOS ANGELES COUNTY, 325 tons, State highway to Elsegundo.

POMONA, CAL., 250 tons, Progress-Bulletin building.

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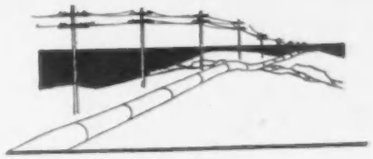
Railroads Expected to Get Some Rate Advances

WASHINGTON, Sept. 22.—With arguments in the proposed 15 per cent rail advance rate case beginning yesterday before the Interstate Commerce Commission, the commission has expressed the hope that they will be concluded and the case submitted by Saturday evening. The aggregate time allotted, however, to those assigned to argue the case exceeds one week and it may be necessary to continue into next week before the proceedings are brought to an end. In all there are about 80 listed for argument.

Out of the entire list of appearances, only two steel interests are represented, the Jones & Laughlin Steel Corpn., Pittsburgh, and the Newport Rolling Mill Co., Newport, Ky., both opposed to increased rates. Attorney W. W. Collin, Jr., will appear for the Jones & Laughlin interests and has been allotted 15 minutes. Attorney E. E. Williamson has been granted 20 minutes to plead the case of the Newport Rolling Mill Co. The non-ferrous metal industry, also opposing increased rates, has been allotted one hour for arguments.

Beginning of the arguments renewed speculation as to the time of the decision in the case and its character. The usual crop of Wall Street rumors was broadcast and was discounted in Washington. The prevailing view is that the commission will not grant a general 15 per cent rate increase. In some quarters it is thought that agriculture and horticulture will be entirely exempted from the increase, as suggested by Short Line railroads, but that advances much below 15 per cent will be granted rather generally. Other sources are of the opinion that only a few increases will be granted, but will not call for the maximum asked by the carriers. Still others think the railroads will be turned down flat.

The varying character of the views only accentuate their speculative qualities and by many resolve themselves into the belief that they are of no value. Some taking the latter view point out that the commission itself cannot know its action until after it has digested the case and concluded conferences on it.



PIPE LINES

Hackensack Water Co., Hackensack, N. J., has begun construction of a 52-in. steel pipe line from its reservoir at New Milford, N. J., to a terminus at Grand and Sheffield Avenues, Hackensack, to cost about $1,000,000. The pipe contract was placed some time ago.

Ashland Refining Co., Ashland, Ky., has acquired pipe line system of Cumberland Pipe Line Co., in different parts of Kentucky, with exception of lines in Pulaski, Wayne and McCreary Counties, Ky., for consideration of $420,000, and will connect with its lines for oil distribution. Extensions are planned.

Atlantic Pipe Line Co., a subsidiary of Atlantic Refining Co., Philadelphia, has awarded a contract to Welding Engineering Co., Bartlesville, Okla., for lining up and electric welding of 10-in. pipe line now in course of construction from east Texas oilfield district to Port Neches, Tex., about 180 miles, for oil distribution.

Virginia Gas Distribution Co., Warrenton, Va., has secured franchises for natural gas service at Warrenton, Buena Vista and other points in this vicinity, and will begin installation of pipe lines soon.

Prairie Pipe Line Co. plans to lay a branch pipe line from trunk line to Fort Worth, Tex.

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Railroad Equipment

Missouri Pacific has ordered one 30-ton gasoline-driven locomotive from Plymouth Locomotive Works.

Navy Department is inquiring for three flat cars, 40 tons capacity, and is asking for prices on the repair of eight flat cars.

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A. H. D'Arcambal Heads Steel Treaters

BOSTON, Sept. 22.—Metallurgists and heat treaters from many parts of the country and Canada are pouring into Boston for the National Metal Congress sponsored by the American Society for Steel Treating. Considering the business situation, the attendance is large.

Officers for 1932 have been elected as follows: President, A. H. D'Arcambal, Pratt & Whitney Co., Hartford, Conn.; vice-president, W. B. Coleman, president, W. B. Coleman Co., Philadelphia; treasurer, A. T. Clarage, president, Columbia Tool Steel Co., Chicago; directors for two years, C. F. Tascoe, Canadian Steel Foundries, Montreal, and H. D. McKinney, vice-president, Driver-Harris Co., Harrison, N. J.

Prospect of Temporary Emergency Tariff Widely Discussed By British

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Canadian mills undersell rail and tube syndicates in South Africa.

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Italian steel mills urge Government to prohibit erection of additional capacity.

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French steel works to spend almost $6,000,000 for modernization.

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German steel works suspending additional mills and blast furnaces.

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French banks provide finance for Czechoslovakian locomotive shops, which offer four-year terms.

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(By Cable)

LONDON, ENGLAND, Sept. 21.

THE position of business is complicated by the Government's gold decision and bank rate increases so that trade is temporarily retarded.

A violent controversy has developed over the question of applying an emergency tariff and more prominent business men and others are supporting such a measure.

The Federation of British Industries has requested a temporary emergency tariff on an ad valorem basis, according to classes of commodities. The International Chamber of Commerce has stated that there is no means of correcting the trade balance other than by a tariff or complete prohibition of imports.

The iron and steel markets are worse with more mills closed and others preparing to suspend operations. Prices of Continental mills have not yet been greatly affected by the financial situation, but buyers are unwilling to cover beyond their immediate requirements.

Most of the Welsh tin plate mills have withdrawn all quotations, awaiting reopening of the foreign exchange market. It seems to be generally expected that the new tin plate prices will be fully 1s. per base box above the present price. Galvanized and black sheets are inactive.

The International Steel Cartel has been extended provisionally until Oct. 11. The Dominion Iron & Steel Corpn., Ltd., in Canada has booked an order for 7100 tons of 96-lb. rails for South Africa at about 15s. a ton under the price of the International Rail Makers' Association. Canadian tube mills have sold 78 tons of seamless and welded pipe to South Africa at prices under the quotations of the International Tube Syndicate.

The Société Metallurgique de Senelle-Maubeuge at Longwy, France, plans expenditure of 150.000,000 fr. ($5,880,000) for modernization.

In Germany, the Vereinigte Stahlwerke A. G. is closing its Phoenix works at Dortmund-Horde on Oct. 7, and has notified of impending closure of the Niederrheinische Hütte and the Hütte Vulkan. It is also proposed to blow out the Bochumer Verein blast furnaces and close two steel rolling mills at that plant.

The Italian steel cartel expires Dec. 31, but is expected to be renewed on a revised basis. Consequently mills are keenly competing for tonnage so as to claim larger quotas in the negotiations. German non-members of the cartel are underquoting the members and a period of severe competition appears probable if the cartel is not renewed promptly.

The Italian Government is being urged by industry to prohibit erection of additional capacity in the country, unless such expansion is essential for national defense, and is being asked by cartel members to persuade outsiders to join the renewed cartel.

The Polish Government is planning to reconstruct the Port of Gdynia at a cost of 20,000,000 to 25,000,000 zloty ($2,236,000 to $2,795,000). The Laurahutte steel works is planning to close entirely.

Sweden has extended prohibition of scrap exports except under license until Feb. 29, 1932. This affects malleable scrap, except tinned or galvanized.

The Soviet Union is reported to have sold quantities of steel shapes and wire to China at low prices.

The Russian iron and steel industry is not producing according to the Five-Year Plan. Output in the first half of this year is placed at 2,350,000 tons of pig iron, which is 61.7 per cent of the program and 1.3 per cent under the output in the first half

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at $4.20

British Prices, f.o.b. United Kingdom Ports

Ferromanganese, export	£9	0s.				$37.80		
Billets, open-hearth	4	17½	to	£5	5s.	20.47	to	$22.05
Black sheets, Japanese specifications	9	10	to	9	15	39.90	to	40.95
Tin plate, per base box (nom.)	0	12¾	to	0	13	2.68	to	2.73
						Cents a Lb.		
Steel bars, open-hearth	7	17½	to	8	7½	1.48	to	1.57
Beams, open-hearth	7	7½	to	7	17½	1.38	to	1.48
Channels, open-hearth	7	12½	to	8	2½	1.43	to	1.52
Angles, open-hearth	7	7½	to	7	17½	1.38	to	1.48
Black sheets, No. 24 gage	8	2½	to	8	7½	1.52	to	1.57
Galvanized sheets, No. 24 gage	8	15				1.64		

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2	6½s.	to	£2	7s.	$9.76	to	$9.87
Billets, Thomas	£2	16s.	to	£2	17s.	$11.76	to	$11.97
Wire rods, low C., No. 5 B.W.G.	4	15	to	5	0	19.95	to	21.00
Rails, light	6	0				25.20		
Black sheets, No. 31 gage, Japanese	11	5	to	12	12	47.25	to	52.92
						Cents a Lb.		
Steel bars, merchant	3	2	to	3	3	0.59	to	0.60
Beams, Thomas, British standard (nominal)	3	2	to	3	3	0.59	to	0.60
Channels, Thomas, American sections	5	12	to	5	14	1.07	to	1.09
Angles, Thomas, 4-in. and larger, over ¾-in. thick	3	1½	to	3	2½	0.58	to	0.59
Angles, Thomas, 3-in.	3	3	to	3	4	0.60	to	0.61
Hoops and strip steel over 6-in. base	4	0	to	4	2½	0.75	to	0.78
Wire, plain, No. 8 gage	5	0	to	5	1¼	0.95	to	0.96
Wire, barbed, 4-pt. No. 12 B.W.G	8	10				1.62		

of last year. Raw steel production is placed at 2,609,000 tons, which is 61 per cent of the program and 13 per cent under the first half of last year, and rolled steel production is 917,000 tons, 53.6 per cent under the program and 31 per cent under the output in the first half of 1930.

Italian output in July was 43,000 tons of pig iron, 126,000 tons of raw steel and 112,000 tons of rolled steel.

German production in August was 499,000 tons of pig iron and 689,000 tons of raw steel.

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Manganese Ore to Be Mined in Germany

HAMBURG, GERMANY, Sept. 12.—The Gewerkschaft Victoria has begun mining operations at manganese ore deposits in Thuringia. These deposits, surveyed about a year ago, are reported as rich in a good grade of ore, which could be mined at low cost. Their extent is said to be sufficient to suggest that an important part of Germany's manganese ore requirements could be furnished from this source.

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New Steel Specification for German Oil Fields

HAMBURG, GERMANY, Sept. 12.—German oil companies have recently adopted a steel specification for oil well casing differing slightly from the usual requirements in the United States. For deep boring, the German specification is 0.4 per cent carbon, 1.2 per cent manganese, 0.25 per cent silicon, 0.25 per cent chromium and 0.04 per cent zirconium. This specification calls for a slightly higher content of chromium and manganese than is usual.

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60-ft. Welded Rails Laid in Germany

HAMBURG, GERMANY, Sept. 12.—The usual standard length of rails used in Germany has been 30 ft. for some years. Recently, however, tests have been made of two rails welded together into a 60-ft. section, and 1200 km. of track has been laid by this method. It is claimed by the German railroads that fewer rail joints greatly reduce noise and provide better traction. By using steel ties, it is said that rapid changes in temperature are conducted into the tie better than with wood, preventing bending from expansion and contraction. The German railroads expect to establish the 60-ft. rail length as standard in the future.

German Business Slowed By Lack of Credit

BERLIN, GERMANY, Sept. 1.—Domestic steel business has been almost completely stopped for the seventh week, because of the increasing number of steel merchants and consumers reported bankrupt or forced to liquidate. In the past week, some 25 German steel merchants have been forced to suspend payments of obligations. This condition has resulted in a majority of transactions on a cash basis, especially necessary as 15 to 18 per cent is the usual charge for open accounts. Few buyers, however, have the necessary cash for their requirements. In certain cities building operations have been stopped temporarily because the contractors could not obtain the necessary cash to pay for the structural steel and other materials. Even credit extensions of two to three weeks have been refused to prominent companies with high rating.

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German Car Builders to Close More Shops

HAMBURG, GERMANY, Sept. 12.—Further concentration in the number of German railroad car building shops is expected. From a total of 41 companies operating 54 plants in 1924, the number has been reduced by mergers and liquidation to 20 companies with 25 plants. As present business is insufficient for existing shops, with future prospects unsatisfactory, three of the principal makers, Westwaggon, Ostwaggon and the Linke-Hoffmann Works, are negotiating to abandon more of their plants.

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Large Diesel Power Plant for California

HAMBURG, GERMANY, Sept. 12.—An order has been booked by the Hooven, Owens, Rentschler Co., Hamilton, Ohio, American licensee of the Maschinenfabrik Augsburg-Nurnberg, for a 35,000-hp. Diesel power station at Vernon, Cal. The Vernon plant will exceed by about 7000 hp. one of Europe's largest Diesel stations now being constructed at Copenhagen, Denmark. It will consist of five 7000-hp. engines of eight-cylinder, 2-stroke, 167-r.p.m., airless fuel injection type.

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French Banks Finance Czechoslovakian Sales

BERLIN, GERMANY, Sept. 10.—Aided by financing provided by French banks, Czechoslovakian locomotive builders, chiefly the Skoda Works, have been securing substantial orders in the Near East. Credit terms extend to four years, and on eight heavy type passenger locomotives just placed by Lithuania the Czechoslovakians underbid British builders by $6,000 and German shops by $2,700. The Indian Government has placed 13 heavy passenger locomotives with the Skoda Works, which underbid the lowest British price by $4,980 each.

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Japanese Piling Orders Total 1500 Tons

YOKOHAMA, JAPAN, Aug. 12.—Although the Seitetsu Jo (Government Steel Works) has just started production of its new design of sheet steel piling, orders from Japanese users total about 1500 metric tons.

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German Used Tools Sold to United States

HAMBURG, GERMANY, Sept. 12.—Of about 1000 machine tools, mostly of modern design, recently sold by the Hannoversche Maschinenfabrik, which has ceased locomotive building, some 350 went to buyers in the United States, Canada and Japan.

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Rustless Steel Patents for Foreign Use Sold

International Rustless Iron Corpn., New York, has sold its foreign patents, exclusive of those in Canada and Mexico, to a European group in exchange for securities representing 1,000,000 shares of the corporation's common stock. A. H. Wild, president of the International company, and Ronald Wild, vice-president of the company and also of its subsidiary, the Rustless Iron Corpn. of America, Baltimore, are associated with the purchasing group. Both have resigned from their positions to devote their time to the development of the foreign business.

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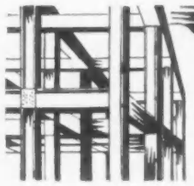
Further Shrinkage in Trackwork Shipments

Production of trackwork for T-rail track of 60 lb. and heavier is reported by the American Iron and Steel Institute to have been only 3924 net tons in August. This is much the smallest monthly total since these figures were first started, in 1924. It represents a drop of 11 per cent from the low July total of 4409 tons and a drop of 42 per cent from the figure for August, 1930, itself much lower than any previous August in some years. Compared with August, 1929, the current figure is a shrinkage of 74 per cent.

For the eight months elapsed, total shipments aggregated 50,946 tons, compared with 89,896 tons in the first eight months of 1930 and 114,099 tons in the same period in 1929.



PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Trade Is Slightly More Promising

Conditions Are Spotty, However—Ford Motor Co. May Spend $1,000,000 on Spring Plant

CONDITIONS in machine tool selling centers throughout the country are very uneven, larger sales and inquiries in some sections being offset by continued dullness elsewhere. Improvement is noted at Chicago, Cleveland, Detroit and Pittsburgh. In future prospects the automobile industry takes first position. The Ford Motor Co. is planning to reequip its present spring plant at an estimated cost of about $1,000,000, and its purchases may include spring forming machinery, heating furnaces and conveyors. The Studebaker Corpn. is retiring old equipment, though it has not yet come into the market for new machines. The Lincoln Motor Co. has bought quite a few new machines. The Ford and Hupp automobile plants recently bought considerable drilling equipment.

The most distinct improvement is in sales of hand tools.

The index of machine tool orders for August, compiled by the National Machine Tool Builders' Association, turned upward from that of July, the gain presumably being due in part to large automobile company orders last month. The August index figure is 71.7, compared with 61.5 for July. This is the first upturn since March, which was the high month of the year at 117.6. The three-months' average still points downward, however, standing at 68.9, against 74.1 at the end of July. It would take only a slight improvement this month to turn the curve upward, away from the second bottom made this year. The first bottom was in January, at 65.3.

The "C" group of machine tool builders, comprising those whose average shipments for 1922-23-24 were less than $10,000, made the best showing in August, having gained 58 per cent in orders over July, while the "A" group, whose average shipments are based on $50,000, made a 33 per cent increase. Shipments were generally heavier in August than in July, bringing about a decrease in unfilled orders. Reporting members of the association showed less than two months' unfilled orders at the August rate of shipments.

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NEW YORK

The past week brought no fresh indications of revival in buying interest. Sales were at a minimum, with inquiries equally scarce. A few companies are making quiet inquiries with a view to eventual rehabilitation of plant equipment, but these are of a preliminary character, and there is no telling how soon action may be expected. It is felt that the critical aspects of international financial affairs may tend to create further uncertainty in quarters that had begun to be hopeful for some early signs of business improvement. The sale of small tools, particularly those that are sold over the counter, has shown a sharp upturn this month.

MILWAUKEE

While machine-tool business remains hesitant, the improvement noted the past week or 10 days is being sustained and the trade is more optimistic than it has been for a long time. Inquiry is becoming more active and, while actual purchases are slow in closing, the belief strengthens that a fair volume is in prospect. There is considerable activity also under the surface. The used tool situation is fairly favorable. While the property of the Kissel Motor Car Co. af Hartford, Wis., will be auctioned by the receivers on Oct. 27, it is not believed that this action will throw any equipment on the market, since it is expected that the bondholders will probably be the only bidders in view of existing conditions.

CHICAGO

Inquiries are more numerous, but the period of improvement is as yet so short that it cannot be taken as pointing the way in the near future. Continental Can Co. has ordered an 18-in. lathe. McCormick works of the International Harvester Co. has purchased three boring machines and a multiple drill, all of heavy design. Another machine tool user has signed an order for a large face-type grinding machine. There is quite a marked improvement in inquiries and purchases of replacement parts and attachments. The Studebaker Corpn. continues to make a study of practices and is retiring old equipment, but has not yet entered the market for new machines. A farm equipment manufacturer is studying its needs of gear blanking machinery.

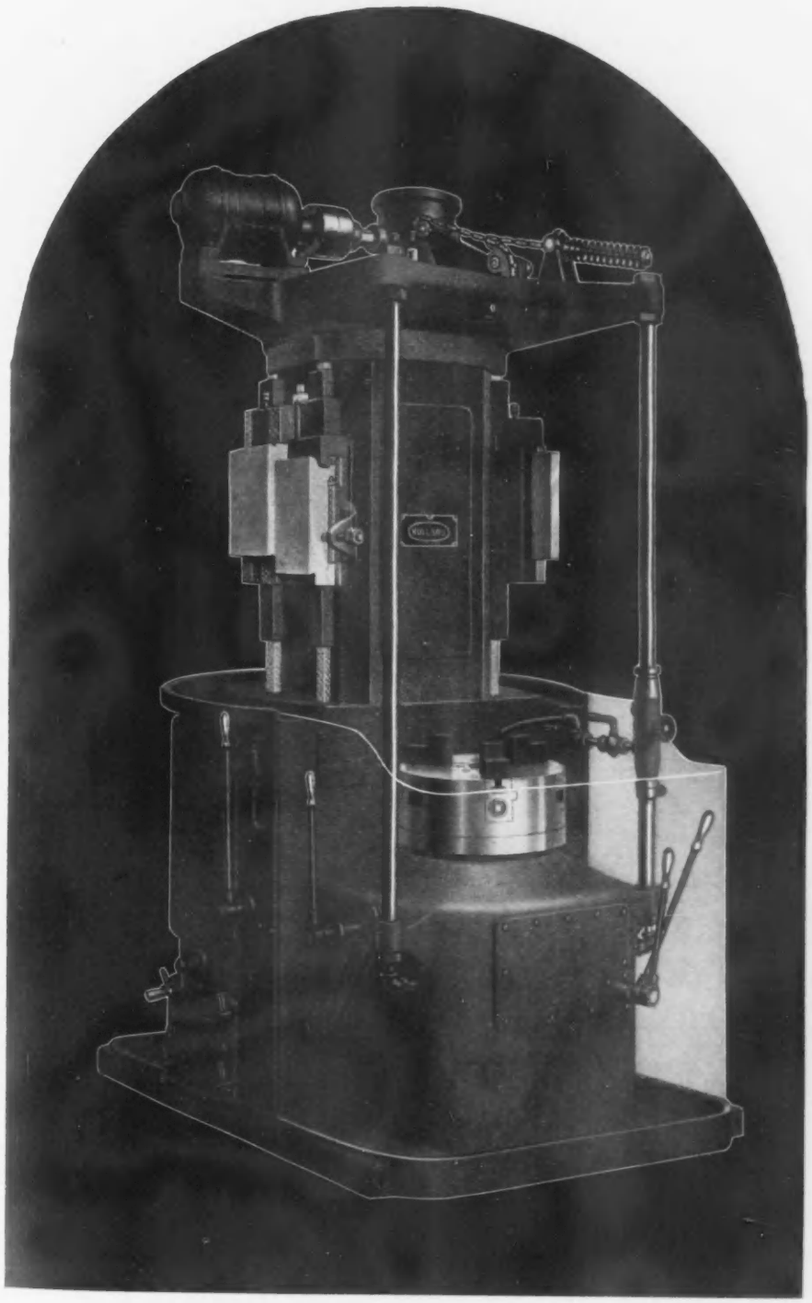
CINCINNATI

New business is small and scattered and demand continues sluggish. Increase in repair orders, however, has been noted and manufacturers feel that this is the forerunner of a revival of interest in retooling. New inquiries are nil.

A district manufacturer received an order the past week from a Missouri school for three 13-in. engine lathes.

CLEVELAND

The machine tool market in this territory was dull the past week, the improvement noted in the previous week not having been maintained. There is a little activity in Detroit, where the Lincoln Motor Co. is reported to have purchased quite a few machines; other business in single tools is pending in the automotive industry. Some motor car manufacturers recently have adopted the policy of trading in old machines for new equipment. The Ford Motor Co. plans to reequip its



BULLARD

AUTO MATIC VERTICAL TURRET LATHE

The automatic features on these single spindle chucking units cut machining time and shop costs to minimum on the in-between or short run production jobs.

Chucks are power operated, and feeds and speeds are variable, changing automatically as required for each operation.

Bullard Auto-Matic Vertical Turret Lathes are universally adaptable to short or long runs of different pieces or different chuckings of the same piece when used singly or in batteries.

Get detailed information by return mail upon request.

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

present spring plant with new equipment throughout, which will include spring forming machinery, heating furnaces and conveyors. It is estimated that this new equipment will involve an expenditure of $1,000,000.

PITTSBURGH

Some machinery dealers in this district have noticed a slight improvement in tentative inquiries, looking toward the installation of equipment for the manufacture of new lines of products. While no immediate orders can be expected to result from this activity, it indicates a tendency on the part of a few manufacturers to combat the depression in a concrete way and not to remain content with the present small volume of business in old lines. The tendency to modernize existing equipment is not so pronounced, but sales engineers are constantly trying to promote such business and occasionally meet with some success.

New orders this month are behind August in point of volume and new pending business of an active sort is scarce. Buying of heavy machinery and equipment is only fair. A local pipe manufacturer has placed orders with a Youngstown district builder for a new push bench type of seamless pipe mill which will be installed as soon as possible.

NEW ENGLAND

The Baush Machine Tool Co., Springfield, Mass., has received sizable orders for multiple drilling equipment from the Hupp Motor Car Co., Detroit, and from the Lycoming Mfg. Co., Williamsport, Pa. It also recently closed an order for drilling equipment with the Ford Motor Co. Other New England machine tool builders have submitted figures on equipment to the Navy Department, automobile companies and to European inquirers, and the outlook for orders appears bright. In contrast, local dealers report little business. They intimate, however, that considerable equipment will be bought late this year. Demand for small tools is expanding slowly.

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New York

A TWO-STORY building to be erected by Central Mfg. District, Inc., Chicago, in that city, has been leased by Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, for branch storage and distributing plant, installation to include cold storage and refrigerating department, mechanical-handling and conveying equipment, etc., to cost over $90,000.

Todd Shipyards Corpn., 25 Broadway, New York, has purchased shipbuilding and repair yards of Jahncke Dry Docks, Inc., New Orleans. Property will be taken over by Todd Engineering, Dry Dock & Repair Co., New Orleans, a subsidiary, for expansion in local plant.

Conrad R. Schumacher, 146 Walnut Street, Lynbrook, L. I., and associates have organized Conrad Razor Blade Co., Inc., with capital of $100,000 and headquarters in Queens Borough, and plan operation of factory for manufacture of razor blades and kindred steel specialties. Irving S. Bodkin, 241 Central Park West, New York, is one of incorporators of company.

Signal Supply Officer, Signal Corps, Army Base, Brooklyn, is asking bids until Oct. 6 for one to 10 self-supporting steel radio towers, 150 ft. high; until Oct. 9 for 12,000 ft. cable and four reels and quantity of cable reels.

J. M. Horton Ice Cream Co., 205 East Twenty-fourth Street, New York, has plans under way for a one-story automobile service, repair and garage building, 200 x 220 ft., for company motor trucks and cars, to cost close to $100,000 with equipment. J. E. Ross, 25 West Forty-third Street, is architect and engineer.

Albany Port District Commission, 74 Chapel Street, Albany, N. Y., Peter G. Ten Eyck, chairman, is asking bids until Oct. 3 for erection of grain elevator, with facilities for storage and distribution of package goods, to cost $1,500,000 with equipment. Arnold G. Chapman is chief engineer.

John Conrad Johnson, 194-15 109th Avenue, Hollis, L. I., and associates have organized A. Johnson Machine Works, Inc., Brooklyn, to operate a general machine and repair plant, including production of machinery and parts. John W. Larson, 249 Cypress Avenue, Bogota, N. J., is interested in company.

Charles Schaefer, Jr., 332 East 149th Street, Bronx, New York, architect, has plans for one-story automobile service, repair and garage building, 105 x 115 ft., to cost close to $100,000 with equipment.

Kings County Lighting Co., 6740 Fourth Avenue, Brooklyn, has plans for two-story addition to power station, to be used primarily as an exhauster unit, to cost about $60,000.

Gold Seal Mfg. Co., Inc., 127 South Fifteenth Street, Newark, manufacturer of radio equipment, electrical appliances, etc., has leased first three floors in former No. 3 mill of Clark Thread Co., East Newark, totaling about 50,000 sq. ft. floor space, for new plant. Works at Newark and branch plant at Poughkeepsie, N. Y., will be removed to new location, where production will be concentrated. Expansion will be carried out for manufacture of television instruments and precision equipment. W. E. Duff is president.

Public Service Electric & Gas Co., Terminal Building, Newark, is negotiating with City Commission, Orange, N. J., for purchase of municipal electric light and power plant at price of $85,000, and agrees to install underground conduit power lines to cost $138,000. Commission has recently taken bids for extensions and improvements in station, including additional machinery, totaling $471,270. Runyon & Carey, 31 Fulton Street, Newark, are consulting engineers.

Unique Art Mfg. Co., 196 Waverly Avenue, Newark, manufacturer of mechanical toys, parts, etc., will defer until early next year erection of one and two-story addition to cost close to $100,000 with equipment. Saul Shaw & Co., 24 Commerce Street, are architects and engineers.

Department of Public Affairs, City Hall, Newark, has taken revised bids on general contract for new municipal automobile service, repair and garage building to cost about $250,000, two stories, 130 x 190 ft. Joseph W. Costello is chief engineer in charge.

American Metal Spinning & Welding Co., Inc., Newark, care of Benjamin Kleinberg, 790 Broad Street, attorney, recently organized by Edward King and associates, plans operation of metal-working plant.

Board of Education, Montclair, N. J., Richard T. Greene, president, plans installation of manual training equipment in addition to Glenfield School, for which bids are being asked on general contract until Oct. 20, to cost $400,000. Starrett & Van Vleck, 393 Seventh Avenue, New York, are architects.

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New England

CONTRACT has been let by Sewer Department, Worcester, Mass., S. H. Brooks, Jr., superintendent, to A. J. Gendron, 114 Colburn Avenue, for three-story shop, 50 x 175 ft., at East Worcester, to cost over $125,000 with equipment. R. C. Gorrani, 175 Green Street, is architect.

Chapman Valve Mfg. Co., Springfield, Mass., manufacturer of heavy gate valves, etc., is planning removal of works of its subsidiary, Coffin Valve Co., Squantum, Mass., manufacturer of similar engineering products, to main works at Springfield, where expansion will be carried out and production concentrated.

Bureau of Supplies and Accounts, Navy Department, Portsmouth, N. H., and Washington, is asking bids until Sept. 29 for a turret lathe, profiling machine, filing and sawing machine, cut-off saw and an automatic checking machine, all motor driven.

Adell Corpn., Orange, Mass., recently organized by John A. Adell, 300 Pleasant Street, with capital of $50,000, will operate plant for production of iron and steel specialties. Mr. Adell will be president and treasurer.

Safety Car Heating & Lighting Co., New Haven, Conn., has developed new air conditioning equipment for passenger railroad cars and plans commercial production in addition to regular car heating and lighting equipment.

Packard Car Agency, 350 Warren Avenue, Brockton, Mass., D. W. Packard, head, has plans for one-story service, repair and sales building, 100 x 200 ft., to cost close to $100,000 with equipment. J. W. Beal Sons, 185 Devonshire Street, Boston, are architects and engineers.

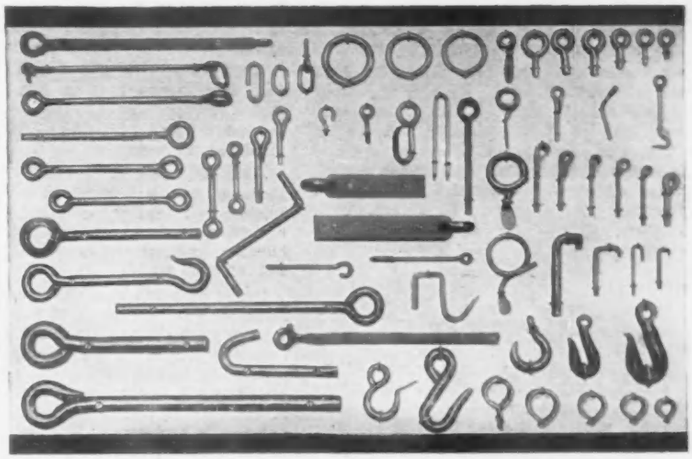
Beverage Products Co., Hartford, Conn., recently organized by W. H. Newick, 31 Shultas Place, and associates, has purchased former local plant of Aetna Brewing Co., and will remodel for production of beverages, including conveying and other handling equipment.

School Committee, Brookline, Mass., plans installation of manual training equipment in new high school unit, for which appropriation of $285,000 has been approved. Kilham, Hopkins & Greeley, 9 Park Street, Boston, are architects.

J. C. Clarke, Riverside, Conn., and associates have organized Clarke Welding Co., with headquarters at Stamford, Conn., and plan early operation of welding and repair works. J. J. Lyons, Sound Beach, Conn., is interested in company.

Moore Drop Forging Co., Springfield,

ALL THESE



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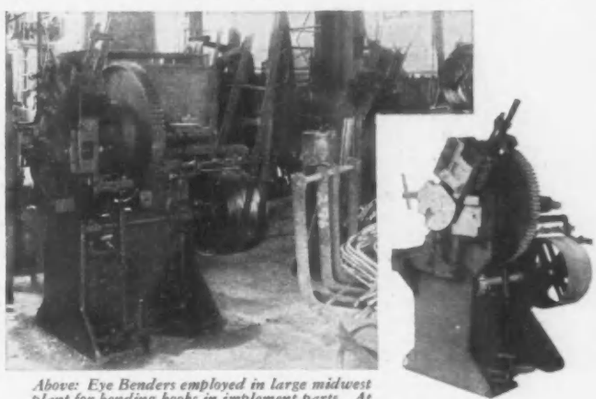
Even though your work requires an infinite variety of bends—round or oval eyes, hooks and single or reverse bends on the ends of bars—Williams, White Eye Benders will give you the accuracy, the ease and the production capacity you require. * * * Send us a description of your requirements and permit us to recommend the type of Eye Bender best suited for your work. We can also give you complete information pertaining to the dies required for your bends. * * * Williams, White Eye Benders are in paying use in many of the leading plants in this country. They combine all of the qualities essential to maximum results at lowest cost. * * * Your attention is called to the list of machines which comprise our line. If you are giving thought to modernizing your production equipment, you will find our catalog of considerable value. * * * Check the items which interest you and we will promptly supply you with complete descriptions.



Above: Eye Benders employed in large midwest plant for bending hooks in implement parts. At right: The No. 22 Williams, White Eye Bender equipped for belt drive.

WILLIAMS, WHITE & CO. PRODUCTS

- Angle Bending Rolls
- Angle Shears
- Bar and Billet Shears
- Benders and Straighteners
- Bulldozers
- Crank Drop Hammers
- Eye Benders
- Forging Hammers
  - Bates—Air Operated
  - Yeakley—Vacuum
  - Justice—Spring
- Forging Rolls
- Gate Shears
- Grinders
  - Automatic Surface
  - Bevel Section
- Multiple Punches
- Plate Shears
- Presses
  - A Frame
  - C Frame
  - Open Throat Multiple
  - Straight Side
  - Tie Rod
- Punches and Shears
  - Single and Double-End
- C-Frame
- Architectural
- Structural
- Coping
- Horizontal
- Rail Breakers
- Rolls
  - Tire
  - For Bending, Flanging and Corrugating Rims and Tires
- Section Serrating Machines
- Riveting Hammers
- Steel Wheel Machines
- Bending Rolls
- Corrugating and Flanging Rolls
- Automatic Spacing Punches
- Spoke Riveting Presses and Hammers
- Tempering Presses
- Tie Rod Presses
- Trimming Presses

Special Machinery, Dies, Tools and Equipment Designed and Built.

GRAY IRON AND SEMI-STEEL CASTINGS

WILLIAMS, WHITE & CO.

CHICAGO PITTSBURG MOLINE ILLINOIS DETROIT NEW YORK

Mass., is remodeling its former hinge shop for machine shop usage. Considerable equipment will be installed.

Central Specialty Corpn., 187 Elm Street, Westfield, Mass., recently organized to do general machine work, including salvaging of cutting tools, is headed by S. F. Cushman, Jr., formerly of Perkins Machine & Gear Co., Springfield, Mass., with whom are associated Charles H. Spencer, and Clarence E. Burns, both formerly with Perkins company.

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Buffalo

WORK will soon be started by International Harvester Co., 606 South Michigan Avenue, Chicago, on one-story service, repair and sales building for motor truck division at Elmira, N. Y., to cost over $60,000 with equipment.

Jamestown Iron Works, Jamestown, N. Y., operated by Thomas Maher & Son, has superstructure nearing completion on one-story foundry and iron works, 60 x 100 ft., to cost close to $40,000 with machinery.

Burnwell Incinerator Corpn., Buffalo, has been formed with capital of $20,000 to take over and expand Burnwell Incinerator Co., 108 Oxford Avenue, manufacturer of incinerator machinery and parts.

Syracuse Washing Machine Co., Solar and Spencer Streets, Syracuse, is beginning production of two new models of electric-operated washing machines for General Electric Co., Schenectady, and has secured contract totaling $1,750,000 running through 1932. Production will be advanced for capacity output of new machines. Company will also continue manufacture of its regular line of Easy washer electric-operated machines and parts.

William Johnson, Groveland, N. Y., plans rebuilding of portion of three-story machine shop and automobile repair works recently destroyed by fire.

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Philadelphia

BIDS are being asked by Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, until Sept. 28 for 100 cylinder wrenches, 25 sets socket wrenches, 75 box socket wrenches and 5 gear pullers, 150 bilge pumps and 75 fuel hand pumps.

Economy Machine & Tool Co., Inc., Philadelphia, recently organized by Raymond L. Morse, 4728 North Fourth Street, and associates, will take over and expand company of same name with plant at 2500 East Westmoreland Street. New organization will specialize in manufacture of plating machinery and parts, tools and other specialties. Henry C. L. Schnoor, 3262 Cedar Street, will be an official of new company.

Commissioner of Institutions and Agencies, State Office Building, Trenton, N. J., will receive bids until Oct. 2 for automatic stoker for mechanical department at State reformatory at Clinton, N. J.; also for a feed-water heater for power house at State reformatory at Rahway, N. J.

Standard Oil Co. of New Jersey, 26 Broadway, New York, has awarded general contract to Karno-Smith Co., Inc., Broad Street Bank Building, Trenton, N. J., for new bulk oil storage and distributing plant at East Burlington, N. J., to cost over $80,000 with equipment.

Metropolitan Edison Corpn., Reading, Pa., has disposed of a bond issue of $5,000,000, part of fund to be used for extensions and improvements in power plants and system.

John D. and S. Stewart Flickinger, Hanover, Pa., have organized Stewart Oil Burner Co., Inc., with capital of $25,000, to operate plant for production of oil burning equipment and devices, valves and kindred equipment.

Board of Education, Chester, Pa., plans installation of manual training equipment in new junior high school, for which general contract has just been let to Richardson & Luce, Weightman Building, Philadelphia, to cost over $200,000. George S. Idell, Corn Exchange Building, Philadelphia, is architect.

Armstrong Cork Co., Lancaster, Pa., manufacturer of flooring, insulation products, etc., has acquired property at Martinez, Cal., as site for new plant for Pacific Coast trade, including power house, machine shop and other buildings, to cost over $1,000,000 with equipment.

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South Atlantic

PLANS have been filed by Sun Oil Co., Haines and Warner Streets, Baltimore, for bulk oil storage and distributing plant, to cost about $60,000 with equipment. Headquarters are at 1608 Walnut Street, Philadelphia.

Catalano & Pecora Construction Co., Eastern Avenue and Kresson Street, Baltimore, has plans for one-story equipment storage and distributing plant, 116 x 230 ft., to cost over $65,000. Marion J. Nasco, 14 East Lexington Avenue, is architect.

Norfolk & Western Railway Co., N. & W. Railway Building, Roanoke, Va., will receive bids until Sept. 30 for 100 wrought steel wheels.

Bureau of Yards and Docks, Navy Department, Washington, is asking bids (no closing date stated) for addition to naval engineering experiment station, Annapolis, Md.

Zinn-Beck Bat Co., 511 Pettigue Street, Greenville, S. C., manufacturer of baseball bats and other turned hardwood products, has awarded general contract to Gallivan Building Co., Gallivan Building, for one-story unit, 60 x 100 ft., to replace works recently destroyed by fire, to cost close to $30,000 with equipment.

Anne Arundel County Board of School Commissioners, Annapolis, Md., plans installation of manual training equipment in new two-story high school, to cost about $200,000, for which bids are being asked on general contract until Sept. 29. Buckler & Fenhagen, 325 North Charles Street, Baltimore, are architects; William H. Emory, Jr., Baltimore Trust Building, Baltimore, is associate architect.

Board of District Commissioners, District Building, Washington, is asking bids until Oct. 6 for one steam-operated electric generating set; until Oct. 2 for three steam boilers.

Southern Public Utilities Co., Charlotte, N. C., has acquired properties of Double Springs Light & Power Co., operating in Cleveland County, and will consolidate. Extensions and improvements are planned, including transmission lines.

Liquid Carbonic Co., McDaniel and Stephen Streets, Atlanta, Ga., manufacturer of bottling and carbonating machinery, has asked bids on general contract for two additional stories to present plant, to cost over $40,000 with equipment. Main plant and headquarters are at Chicago.

L. W. Conant, 603 Hillcrest Street, High Point, N. C., and associates have organized Ko-Rect Posture Chair Co., with capital of $100,000, to operate factory for manufacture of special chairs and turned wood products.

General Purchasing Officer, Panama Canal, Washington, will receive bids until Oct. 9 for bolts, nuts, rivets, washers, air compressor, pedestal grinder, paper knife grinding machine, electric blower, pipe fittings, rails, track bolts, split switches, rail frogs, screw spikes and other equipment.

Department of Public Buildings and Public Parks, Navy Building, Washington, has received low bid on general contract from H. R. Blagg Co., Dayton, Ohio, for seven-story and basement storage and distributing plant for Federal equipment at $907,895. Lockwood Greene Engineers, Inc., 100 East Forty-second Street, New York, is consulting engineer.

General Purchasing Officer, Panama Canal, Washington, will award contract for Madden Dam, Panama Canal Zone, to W. E. Callahan Construction Co., St. Louis, and Peterson, Shirley & Gunther Co., Omaha, Neb., which submitted low joint bid of $4,048,657. Bids are being asked until Oct. 14 for hydraulic and electrical machinery for hydroelectric generating plant in connection with dam.

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Pittsburgh

BUREAU of Water, Department of Public Works, City-County Building, Pittsburgh, has begun erection of new electric-operated pumping plant for municipal water system, to cost $900,000 with machinery. James H. Kennon is managing engineer of Bureau.

United States Engineers' Office, Pittsburgh, will receive bids until Sept. 29 for one 30-in. motor-driven lathe.

J. H. James, purchasing agent, Pittsburgh & Lake Erie Railroad Co., Terminal Building, Pittsburgh, is asking bids until Sept. 30 for equipment for installation, maintenance and repair of mechanical interlocking plants, electro-pneumatic and electric interlocking equipment, car retarder systems, automatic train controls, etc.

National-Erie Co., Erie, Pa., manufacturer of steel castings, gears, etc., has been reorganized and will resume production at once, following curtailment for several weeks. William J. Johnson, Pittsburgh, has been elected president to succeed A. Hunter Willis. B. L. Weaver will continue as vice-president and treasurer, and Henry E. Scott as secretary and assistant treasurer.

Aetna-Standard Engineering Co., Ellwood City, Pa., manufacturer of rolling mill machinery, will increase production at once, adding more than 250 operatives to working force.

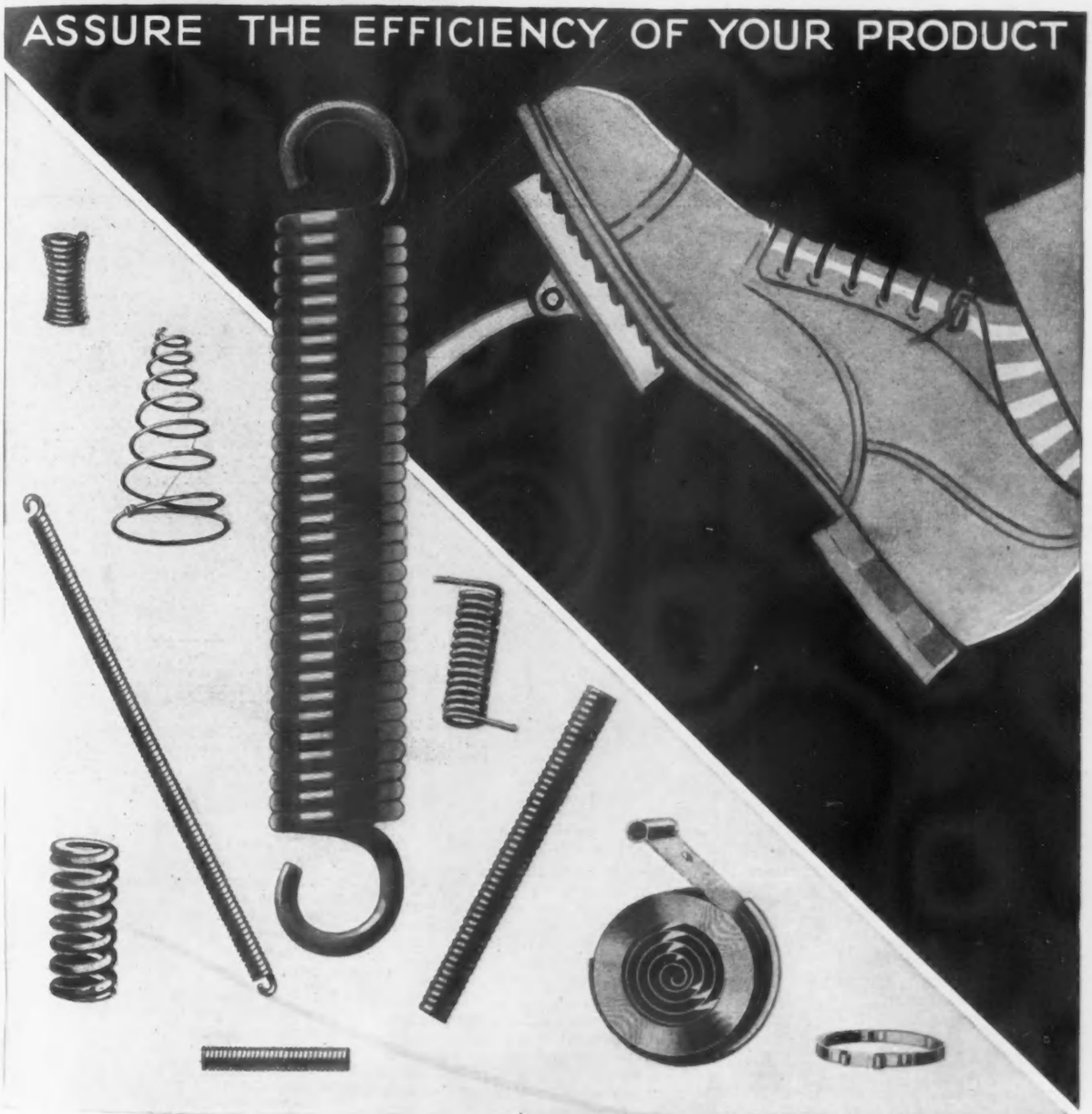
United States Engineers' Office, Pittsburgh, is asking bids until Oct. 9 for sale of condemned equipment and material at Government boatyards, West Monessen, Pa., including boilers, engines, contractors' equipment, etc., and about 163 tons of scrap iron, steel, bronze and other metals.

American QUALITY Steel & Wire Company

SPRINGS

A PRODUCT is no better than the springs on which its operation depends. Failure at a critical moment is sure to mean customer dissatisfaction—expensive service—and loss of future sales. Therefore—the careful selection of a source of supply is of the utmost importance. Realizing this most manufacturers have standardized on American Steel & Wire Company Quality Springs. Consistent quality, reliability beyond question and exceptional service are the facts on which their choice is based. Write us today for complete and detailed facts.

ASSURE THE EFFICIENCY OF YOUR PRODUCT



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AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago — SUBSIDIARY OF UNITED STATES STEEL CORPORATION — And All Principal Cities

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco

Export Distributors: United States Steel Products Company, New York

Chicago

CONTRACT has been let by American Airways, Inc., Lambert Field, Robertson, Mo., to Austin Co., for new one-story hangar, 165 x 200 ft., with reconditioning and repair facilities at Chicago airport, to cost about $125,000 with equipment. It will replace a unit destroyed by fire several months ago. Hoerner, Baum & Froese, 3605 Laclede Avenue, St. Louis, are architects.

Common Council, Lenox, Iowa, has extended date for bids for municipal electric light and power plant from Sept. 22 to Oct. 6, to include two Diesel engine generating units with auxiliary equipment and distributing system. It is estimated to cost about $100,000. L. B. Carruthers is town clerk.

Interstate Iron Mining Co., Hibbing, Minn., has awarded general contract to Lenci & Lenci, Virginia, Minn., for three one-story additions for storage and distribution, to cost over $45,000 with equipment.

Bureau of Reclamation, Denver, is asking bids until Oct. 20 for equipment for Grand Valley power plant, Grand Valley project, Colo., including two 2300-hp. vertical hydraulic turbines, two turbine governors and governor pumps, two 1875-kva. electric generators with direct-connected exciters, power plant switchboard and accessory equipment.

Board of Education, Grand Forks, N. D., plans installation of manual training equipment in new two-story junior high school to cost about $265,000, for which general contract has been let to Thorvaldson-Johnson Co., Clifford Block. Theodore B. Wells, First National Bank Building, is architect.

Pines Winterfront Co., 1115 North Cicero Avenue, Chicago, manufacturer of radiator fronts and other automobile equipment, has acquired Aske Fumer Co., Minneapolis, manufacturer of electric priming devices for gasoline service and other automotive specialties. It is proposed to remove plant to Chicago, where production will be concentrated in future.

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Detroit

AN appropriation of $1,070,000 has been authorized by Detroit Edison Co., 2000 Second Street, Detroit, for expansion and improvements at Connors Creek steam-operated electric generating station, including installation of additional equipment. Work will be carried out this fall.

United Steel & Wire Co., Battle Creek, Mich., has asked bids on general contract for a one-story addition, to cost over $35,000 with equipment. L. J. Sarvis, Battle Creek, is architect.

Norge Corpn., 7601 Central Avenue, Detroit, manufacturer of electric refrigerating units, a subsidiary of Borg-Warner Corpn., has purchased Alaska Refrigerator Co., Muskegon and Muskegon Heights, Mich., manufacturer of refrigerators, cabinets, etc. Alaska company has been manufacturing refrigerator cabinets for Norge electric units and purchasing company plans to concentrate such production in future at Muskegon factories, expanding present facilities.

Chevrolet Motor Co., Holbrook Street, Detroit, has awarded general contract to H. G. Christman-Burke Co., Fisher Building, for one-story machine shop for apprentice instruction, to cost over $50,000 including equipment.

Wolverine Smelting & Refining Co., Detroit, care of Dean F. Carscadden, 241 Summitt Avenue, recently organized by Mr. Carscadden and associates with capital of $30,000, plans operation of local non-ferrous metal works. D. E. Bliss, Flint, Mich., is interested in new company.

Copeland Products, Inc., Mount Clemens, Mich., manufacturer of electric refrigerating units, parts, etc., is planning a one-story engineering unit to cost about $50,000 with machinery. Later, company contemplates expansion in different departments of plant, including a new assembling unit.

City Council, Petoskey, Mich., has been authorized to purchase hydroelectric generating plant of George B. McManus on Bear River, with undeveloped power site and other property totaling over 100 acres, for municipal service. Property will be developed for larger output with power line construction in different parts of district.

Skinner Motors, Inc., 2231 Dalzelle Street, is developing a new sliding valve motor of four-cylinder type, about 80-hp. rating, and plans to place unit in commercial production soon.

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Gulf States

MUNICIPAL Water, Light and Power Department, Austin, Tex., has secured permission to carry out expansion and improvements at municipal electric power plant to cost $314,000, including installation of two new boilers of 900-hp. capacity and other equipment. It is expected to begin work in about 60 days.

C. S. Messenger, McCamey, Tex., and associates have begun erection of a new oil refinery in Pecos Valley pool, Pecos County, to cost over $100,000 with storage and distributing units and pipe line facilities. It is proposed to organize a company to operate plant.

Board of Education, San Antonio, Tex., plans installation of manual training equipment in new two-story junior high school in Woodlawn Park, to cost $200,000, for which plans are being drawn by Phelps & DeWees, Gunter Building, architects; L. D. Royer, Smith-Young Tower, is mechanical engineer.

Standard Tire & Rubber Co., Hammond, La., recently organized by T. C. Gould, Hammond, and associates, plans establishment of plant for manufacture of automobile tires, tubes and other rubber products, to cost over $85,000 with equipment. Mr. Gould will be president of company.

Heck & Hickman Marine Ways & Machine Shop Co., Fort Pierce, Fla., has leased waterfront property for establishment of shipyard for yachts and light seacraft. A marine railway will be built, 400 ft. long, with one-story machine shop, 40 x 55 ft., and other shop units. Initial plant will cost over $50,000 with equipment.

Coastal Petroleum Corpn., Mobile, Ala., care of Carl H. Hammond, Mobile, resident engineer, recently organized with capital of $200,000 by Victor H. Smith, Tulsa, Okla., and associates, has secured site on Blakeley Island and will soon begin erection of new oil refinery to cost over $100,000 with machinery. Dock will be built for handling water shipments of crude oil; storage and distributing plant will be erected.

Common Council, Memphis, Tex., has authorized a bond issue of $65,000, fund to be used for installation of a municipal natural gas distributing system.

Board of Regents, University of Texas, Austin, has plans for a new engineering building and other mechanical and science structures in connection with a program for eight new buildings, for which fund of $4,500,000 is available, including equipment. Herbert M. Greene, La Roche & Dahl, Dallas, Tex., are architects; Paul P. Cret, Architects' Building, Philadelphia, Pa., is consulting architect.

Lawson Rubber & Mfg. Co., South Beckley Street, Dallas, Tex., B. H. Abbott, vice-president, has leased building at 2003 St. Louis Street, New Orleans, for manufacture of mechanical and other rubber products.

Board of Education, Dallas, Tex., contemplates installation of manual training equipment in two new junior high schools for which plans have just been authorized, including structure in Oak Cliff district to cost $250,000, plans to be ready for bids not later than Dec. 1; and unit near Trinity River to cost $200,000, for which plans are to be available for bids by Jan. 1. Mark Lemmon, Dallas, is architect for first-noted school, and Bryan & Sharp, Dallas, architects for Trinity River school.

Browning-Ferris Machinery Co., 205 Exposition Avenue, Dallas, Tex., manufacturer of oil well equipment and other machinery, contemplates a branch plant at Houston, Tex., including one-story machine shop, and storage and distributing building.

Blue Ribbon Refining Co., Dallas, Tex., has work under way on a new oil refinery at Kilgore, Tex., to use crude oil from east Texas oilfields, to cost close to $100,000 with machinery.

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Cincinnati

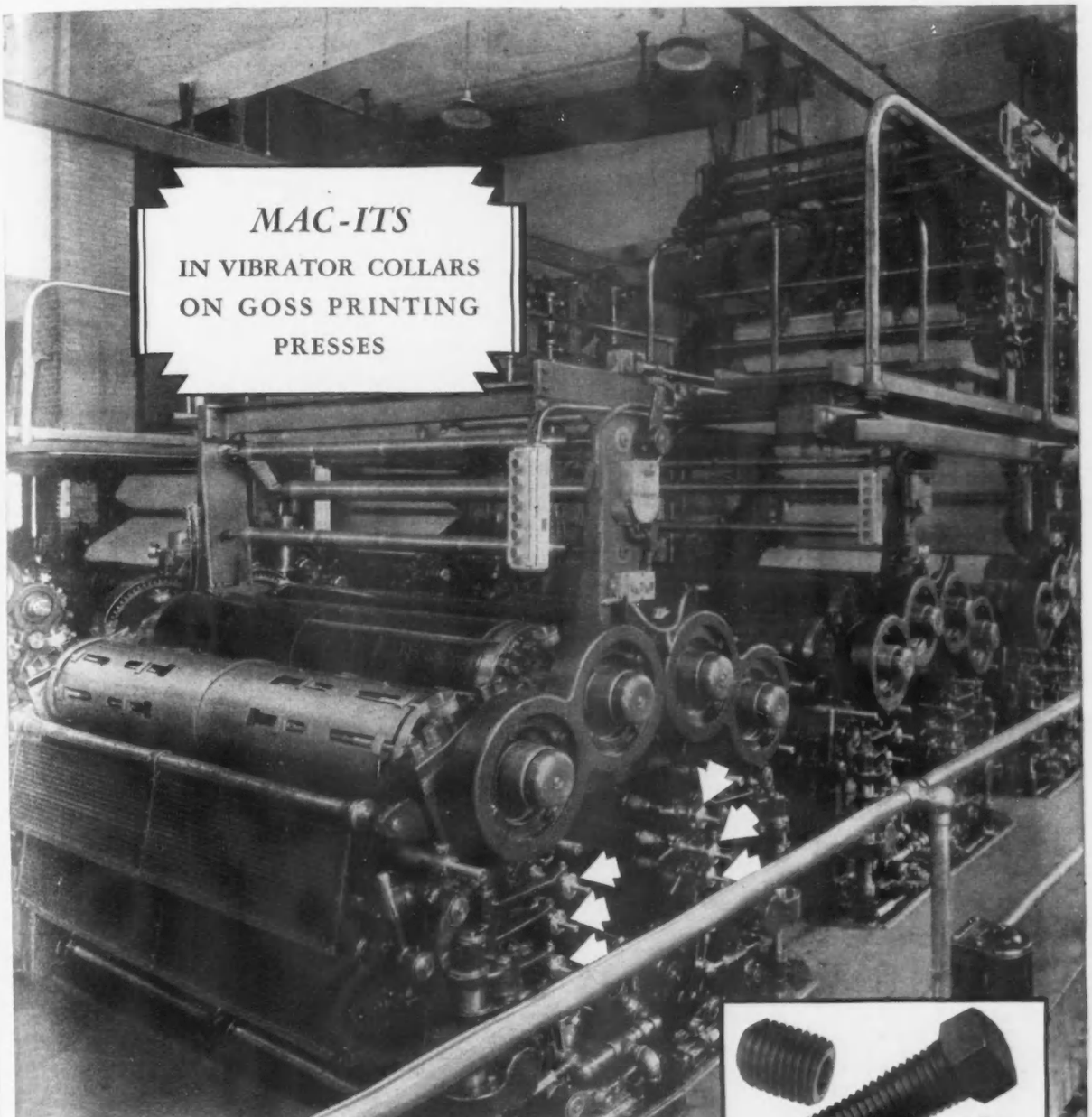
BOARD of Licking County Commissioners, Newark, Ohio, will receive bids until Oct. 3 for one underfeed stoker for County infirmary. J. B. Williams is clerk.

Construction Quartermaster, Army Air Corps, Washington and Dayton, Ohio, will soon take bids for new buildings at Fairfield Airport, Dayton, including two hangars, 110 x 240 ft., to cost about $143,000 with reconditioning and repair facilities; one-story heat and power building, $20,000; oil reclamation building, $15,000 and other structures.

Board of Education, Nashville, Tenn., plans installation of manual training equipment in new three-story and basement high school at East Nashville, 210 x 270 ft., for which bids have been asked on general contract, to cost close to $500,000. Marr & Holman, Stahlman Building, are architects.

Louisville Gas & Electric Co., Louisville, has taken out permit for a power substation, to cost about $250,000 with machinery. Company plans erection of similar unit to cost close to like sum in Crescent Hill section and will make transmission line improvements in Highlands district.

Contracting Officer, Wright Field, Dayton, Ohio, is asking bids until Sept. 29 for five centrifugal water pumps, 15 pairs



INTRICATE, ponderous, yet as delicately balanced as a fine watch — the modern high speed multiple printing press is one of the most costly "production machines" known. Here is part of an installation of 32 GOSS low-construction units and eight pairs of folders in the plant of THE PITTSBURGH PRESS, which will produce 157,000 newspapers of 64 pages each — printed, folded, counted and delivered — *per hour.*

And in this maze of mechanism MAC-IT Hollow Safety Set Screws are used in vibrator collars on the inking rolls and in nearly twenty *other important locations where screw breakage or failure might cause the great press to be stopped, delaying publication of a metropolitan daily.* But a MAC-IT will not break . . . *and GOSS knows it. That is why MAC-ITS are used.*

In the close-up are shown three standard types of this famous heat treated alloy steel screw — the MAC-IT Socket Head Cap Screw, Square Head and Hollow Safety Set Screws — choice of builders of fine machines. The Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio.

DISTRICT OFFICES:

136 FEDERAL STREET - - - BOSTON, MASS.
30 CHURCH STREET - - NEW YORK, N.Y.
11 S. DESPLAINES STREET - - CHICAGO, ILL.
5549 PINE STREET - - PHILADELPHIA, PA.
2832 EAST GRAND BLVD. - - DETROIT, MICH.
335 FIFTH AVE. - - - - PITTSBURGH, PA.

STRONG, CARLISLE & HAMMOND

STOCKED BY DISTRIBUTORS IN MORE THAN 150 PRINCIPAL CITIES

airplane wheels; until Sept. 30 for 137 propeller blades, pipe bushings, couplings, nipples, plugs, etc.; until Oct. 5 for 420 landing lamp assemblies.

Board of Education, Bexley, Ohio, plans installation of manual training equipment in new two and three-story high school to cost over $350,000, for which general contract has been let to Robert H. Evans & Co., 295 East Broad Street, Columbus, Ohio. Miller & Reeves, 203 East Broad Street, Columbus, are architects.

Department of Public Welfare, Columbus, Ohio, John McSweeney, director, is arranging allotment of fund of $4,500,000 from bond issue of $7,500,000 for department, scheduled for approval at November election. Work will include addition to industrial building at Dayton State Hospital to cost $15,000, new boilers, stokers and other power equipment at same institution to cost $30,000; extensions in power house at Massillon State Hospital, including new engines, boilers, stokers and auxiliary equipment, $60,000, and water tank and piping, $15,000; refrigerating and cold storage plant unit at institution for feeble-minded, Columbus, to cost $100,000 with machinery; addition to power house at Hawthorneden Farm, Cleveland, $35,000 and new industrial building at same institution, $35,000; extensions and improvements in boys' industrial school, Lancaster, $150,000. John Youngblood is consulting engineer for department.

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St. Louis

COMMON Council, Everton, Mo., plans installation of steel tank and tower, with pumping machinery, for deep-well service, in connection with new distributing system for municipal waterworks. J. D. Alexander, Springfield, Mo., is engineer.

Blair Milling Co., Atchison, Kan., E. Blair Hackney, president, has awarded general contract to Ryan Construction Co., Keeline Building, Omaha, Neb., for addition to grain elevator, to cost over $45,000 with equipment. Horner & Wyatt, Board of Trade Building, Kansas City, Mo., are consulting engineers.

Transcontinental & Western Air, Inc., 420 Lexington Avenue, New York, has approved award of general contract to S. Patti Construction Co., Finance Building, Kansas City, Mo., for group of buildings at Kansas City municipal airport, to be owned by city and occupied under lease. Buildings will occupy area, 172 x 490 ft., with one-story hangar, 125 x 400 ft., and 50-ft. lean-to extension running full length of building for machine, repair and service shops; one-story building, 40 x 120 ft., for motor-testing and other service, to cost about $300,000 with equipment. Alonzo H. Gentry, March Building, Kansas City, is architect.

City Council, Sullivan, Mo., has engaged W. A. Fuller Co., 2916 Shenandoah Avenue, St. Louis, consulting engineer, to prepare plans for municipal electric light and power plant to cost $80,000 with equipment. Bonds have been approved in that amount.

City Council, Sedalia, Mo., is considering a municipal electric light and power plant, and will have estimates of cost made.

Solid Steel Scissors Co., Fort Smith, Ark., has awarded general contract to Z. S. Rambo Co., Fort Smith, for rebuilding one-story plant recently partially destroyed by fire.

R. P. Farnsworth & Co., Inc., Little Rock, Ark., is planning purchase of a combined sand and gravel steel bin, 40 to 60 tons capacity, either volume or weighing batchers attached; also one mast tower, 1 yd. capacity, 100 ft. high, and a tilting mixer, 1 yd. capacity, Smith type.

Phillips Petroleum Co., Bartlesville, Okla., contemplates erection of a natural gasoline producing plant in east Texas oilfield district, to cost over $85,000 with equipment. Storage and distributing plant will also be established.

P. L. Gregersen, 4248 Harrison Street, Sioux City, Iowa, and associates have acquired property at South Sioux City, Neb., for airport, and plan erection of one-story hangar with repair facilities, and other field units.

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Cleveland

DEPARTMENT of Public Service, City Hall, Cleveland, Rees H. Davis, director, has plans for one-story municipal repair shop with garage facilities for city-owned automobiles, totaling about 40,000 sq. ft. floor space, to cost over $75,000 with equipment. Herman Kregelius, City Hall, is city architect.

Civic Gas and Electric Committee, East Liverpool, Ohio, care of J. T. Croxall, chairman, recently appointed, is investigating costs and details for municipal electric light and power plant in East End district.

Carburetor Parts & Service Co., Akron, Ohio, care of Shank & Cain, 938 Kenmore Boulevard, attorneys, recently organized by Neil H. Bissell, Akron, and associates, plans operation of automobile equipment and repair works, including parts production, etc.

National Carbon Co., Madison Avenue and West 117th Street, Cleveland has arranged for removal of flashlight case division from Newark, N. J., to Cleveland works, where about 50,000 sq. ft. of space will be given over to this line of output.

Municipal Power Department, Dover, Ohio, Robert Miller, Chief engineer, plans early call for bids for extensions in municipal electric light and power plant, including installation of 1500-kw. turbo-generator unit and accessories, to cost about $75,000. Waldo Hartline is city engineer.

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Indiana

BIDS will be received by Petersburg Water Filtration Corpn., Petersburg, until Oct. 5 for equipment for new plant, including Diesel engine, generating equipment and accessories, electric-operated centrifugal pumps, air blower, chlorinators, laboratory apparatus, gages, meters and accessories. Charles H. Hurd, Mutual Insurance Building, Indianapolis, is consulting engineer.

Security Oil & Refining Co., Evansville, care of Dr. Paul Lynch, president, organized a few months ago, has authorized erection of crude oil refinery at Howell, near Evansville. Initial unit will have a capacity of 1000 bbl. a day and will cost about $75,000 with machinery. Compounding plant will be established for manufacture of lubricating oils, grease and other by-products. Philip Reisinger is vice-president, and Charles Lauterslager, treasurer, both of Evansville.

Schacht Rubber Co., Noblesville, manufacturer of rubber goods and novelties, will electrify its plant, discontinuing steam service. Expansion in plant capacity is contemplated later.

Electro-Stoker Mfg. Co., Indianapolis, care of L. F. Shuttleworth, 2251 North New Jersey Street, recently organized by Mr. Shuttleworth and associates with capital of $10,000 and 1000 shares of common stock, no par value, plans operation for manufacture of special coal stokers, parts, etc. Otto N. Moore and A. J. Krueger, Jr., both of Indianapolis, are interested in company.

Swenson Stone Co., Bloomington, has plans for a one-story mill, 55 x 180 ft., at Stinesville, for cutting, grinding, polishing and other finishing operations, to cost close to $40,000 with machinery.

Plant and real estate of Jenkins-Vulcan Spring Co., Richmond, Ind., which has discontinued operation, will be disposed of at a private sale to some industrial company. Equipment of plant has been sold.

Automotive Hardware, Inc., Indianapolis, has leased 10,000 sq. ft. of floor space at 34-38 South Cruse Street, and expects to be in its new quarters by Nov. 1. Company manufactures and carries a large stock of heavy hardware, such as screws, bolts, nuts, washers, rivets, bearings and similar products used in manufacture and repair of automobiles, motors and other machinery.

Milholland Sales Engineering Co., Indianapolis, recently incorporated to provide additional capital for expansion, has moved into larger quarters at 1145 East Twenty-second Street. New products are being developed to complete its line of drilling, tapping and milling units.

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Milwaukee

FOLLOWING improvements to plant and equipment, Delta Chemical & Iron Co., Escanaba, Mich., will resume operations Oct. 1, employing about 175 extra men. New buildings have been added preparatory to instituting new process in acetic acid manufacture.

Wisconsin Industrial Commission has approved revised plans for a $100,000 briquetting plant at Ashland, Wis., for Pittsburgh & Ashland Coal & Dock Co., 1014 Forshay Tower, Minneapolis, and bids for construction will be asked at once. Engineer in charge is Roland C. Buck, Inc., 919 Tower Avenue, Superior, Wis. F. M. Hogan is manager at Ashland.

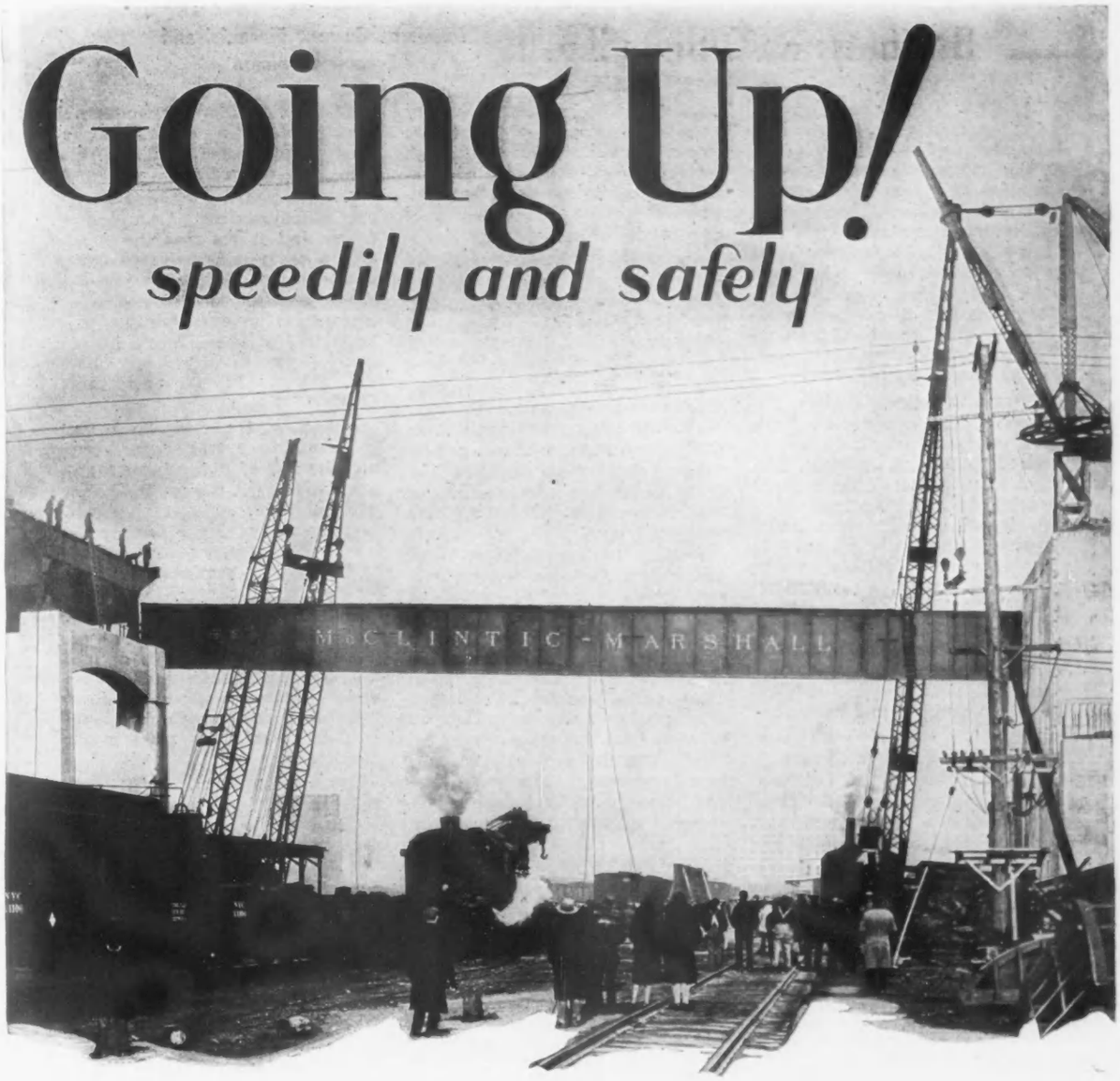
Nordberg Mfg. Co., 3073 South Chase Avenue, Milwaukee, has placed contract with Coddington Engineering Co., 1012 North Third Street, local, for general plant improvements costing about $50,000, including erection of new monitor on roof of main foundry, 100 x 400 ft.

Common Council, Wisconsin Dells, Wis., has voted bond issue of $70,000 for erection and equipment of addition to high school, one wing to be equipped for manual training department. N. A. Landt is secretary of Board of Education.

William J. Raeuber, architect, Manitowoc, Wis., is revising plans for new Manitowoc vocational school to bring cost

Going Up!

speedily and safely



It's a spectacular sight to watch a giant girder being hoisted speedily and safely into place but the remarkable part about it is the men and the machines which make possible such a feat. The above view shows a McClintic Marshall job with three Industrial Brownhoists and a derrick placing a 154-foot, 84-ton girder into position seventy feet above the ground. This is one of the longest girders ever erected in this country.

Absolute dependability and economy of operation are essential characteristics of Industrial Brownhoist cranes—features which make them the choice of the majority of the country's leading structural erection companies, railroads, and industrial plants. To those interested in placing their handling methods on the same money saving basis, our unequalled experience and the world's most complete line of these cranes are always available.

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INDUSTRIAL BROWNHOIST

Business as Others See It

Digest of Current Financial and Economic Opinion

FOREIGN influences, accentuated this week, continue to exert a restraining effect upon the domestic situation. Some observers fear that we shall not emerge from the doldrums until the European crisis is past. Not a few are urging, impatiently, that we go our own way. And there seems to be strong opposition to a present extension of the moratorium beyond next July. That would "gum things up," it is said, both politically and financially.

Harvard Economic Society, *Financial Chronicle* and New York *Times* all emphasize the importance of the foreign influence. The latter paper blames international financial troubles for lack of a gain ere this in our own heavy industries (producers' goods). It notes a growing failure of the lighter industries (consumers' goods) to hold up and points out that these lighter industries "led the way out of the 1921 depression. . . . Easier credit, when the European crisis passes, should accelerate such operations and hasten recovery."

Alexander Hamilton Institute tells us that "confidence" is necessary to recovery. "Due to the great confidence crisis, there are no outflows of gold from countries with low interest rates. But there is an inflow of gold into these countries from countries with high interest rates. So long as this situation lasts, an equitable redistribution of the monetary stock of gold cannot be expected."

Meantime, "while no recovery of significance is visible, the existing state of trade appears free from the disquieting and drastic declines which were prevalent a year ago."

Annalist credits Mr. Ford with prognosticatory powers. His "new model will not appear until early next year. . . . In 1921 . . . and at subsequent critical periods he timed his selling efforts so as to ride on the crest of the business upswing."

Noting that most "plans out" are inclined "to look to some outside agency for help, instead of relying on individual initiative, *Annalist* speaks of Mr. Swope's plan as "sounder and in general more promising." But the question arises as to how far an industry or a company may be willing to surrender its individual freedom. "With the example of the railroads' experience with the Interstate Commerce Commission, and of the public utilities' experience with various regulatory bodies," little hope is held out for industrial acceptance of a Federal supervisory body. Some hold that politics would here rule.

Commerce and Finance features the maladjustment of purchasing power and opines that the "value of the dollar is to be considerably greater than that to which we have become accustomed"—i.e., prices will be consistently lower. But "the cost of building construction . . . is still 98 per cent above the 1914 level, or practically double."

Silberling, too, finds "a spread between the average wage rate and the cost of living index which is as wide as it was in the palmy days of 1929. . . . It is not by keeping *wages* high, but by increasing the *aggregate payrolls* of the country, that prosperity can be brought back."

Harvard sees little hope that our customary 15 per cent autumn expansion will occur, but "part of the upturn is to be expected, even under present conditions." Agricultural "returns will be lower than last year," but more evenly distributed.

General approval of Britain's gold-standard course is expressed in the early comments from a variety of sources.

within $200,000, and new bids will be asked at once. Under original bids cost exceeded $226,000.

August Kuehl has withdrawn from partnership of Kuethe & Kuehl, machinists, Marshfield, Wis., and his interest has been taken over by Alfred Kohs. Business will be continued as Kuethe & Kohs Machine Works.

Pacific Coast

BIDS will soon be asked by Six Companies, Inc., 405 Montgomery Street, San Francisco, contractor for Hoover dam, Boulder City, Nev., for sand and gravel plant at last-noted place, including digging, washing, loading, distributing and other machinery, to cost $250,000. Ellison & Russell, Pacific Building, San Francisco, are engineers.

Vegetable Oil Products Co., 621 South Hope Street, Los Angeles, has plans for a one-story factory at berth 187, Los Angeles Harbor, to cost about $21,000 with equipment.

Hacker Pipe & Supply Co., Los Angeles, care of A. C. Hacker, San Marino, Cal., recently organized by Mr. Hacker and associates with capital of $100,000, contemplates operation of plant for production of iron and other metal pipe. J. R. Dickinson, Pasadena, Cal., is interested in company.

Vallejo Electric Light & Power Co., Vallejo, Cal., has plans for a one-story power substation, to cost $100,000 with machinery. W. A. Jones, 403 Alameda Street, is engineer.

Central California Ice Co., Tulare, Cal., H. F. Allard, manager, is planning erection of one-story ice-manufacturing plant, 60 x 100 ft., to cost about $50,000. Machinery will be electric-operated.

Utah-Idaho Cement Co., Brigham City, Utah, is planning to rebuild part of cement mill recently destroyed by fire, with loss close to $100,000 including equipment.

Piestrup Plumbing & Heating Co., 5433 Ballard Street, Seattle, has filed plans for a one-story machine shop and pipe works.

Rainier Pulp & Paper Co., Shelton, Wash., has awarded general contract to Austin Co., Seattle, for a one-story addition, 60 x 160 ft., for storage and distribution, to cost $30,000 with equipment.

City Water Department, Tacoma, Wash., W. A. Kunick, superintendent, contemplates call for bids for three electric-operated pumping units and auxiliary equipment, capacity 20,000,000 gal. daily, for installation at Hood Street reservoir.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, is planning extensions and improvements in properties near Santa Rosa, Cal., including rebuilding of about 20 miles of high-tension transmission line, to cost $70,000.

Texas Corpn., 929 South Broadway, Los Angeles, is planning to rebuild part of oil absorption plant at Kettleman Hills, Cal., recently destroyed by fire, with loss of more than $350,000 including equipment.

Foreign

WORK is under way by Freeport Texas Co., 122 East Forty-second Street, New York, on manganese plant in Cuba, to operate under new process. Plant will have initial output of about 100,000 tons a year and first unit is expected to be ready for service in January. It will cost over $400,000 with machinery.

Ministry of Interior, Government of Egypt, Cairo, is asking bids until Dec. 22 for erection of complete electric power station at Tantah.

General Manuel Perez Trevino, Piedras Negras, Coahuila, Mexico, formerly Secretary of Agriculture, Mexico, is at head of project to erect new meat-packing plant, to cost over $80,000 with machinery.

Properties of Compania Azucarera Antillas (Antilla Sugar Co.), an interest of Punta Alegre Sugar Co., 82 Beaver Street, New York, will be sold at public auction at Holguin, Cuba, Sept. 30, including two cane sugar grinding mills at Baguanos and Tacajo, equipped for annual capacity of 600,000 bags, and other assets.